

TEXT CUT BOOK

THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME III

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ã as in *alc*, *fate*.
 ä " " *senate*, *chaotic*.
 â " " *glare*, *care*, and as *e* in *there*.
 ă " " *am*, *at*.
 ă " " *arm*, *father*.
 â " " *ant*, and final *a* in *America*, *armada*, etc.
 á " " *final*, *regal*, *pleasant*.
 ă " " *all*, *fall*.
 ă " " *eve*.
 ă " " *elate*, *evade*.
 ă " " *end*, *pet*.
 ă " " *fern*, *her*, and as *i* in *sir*, etc.
 ă " " *agency*, *judgment*.
 i " " *ice*, *quiet*.
 i " " *quiescent*.
 i " " *ill*, *fit*.
 ă " " *old*, *sober*.
 ă " " *obey*, *sobriety*.
 ă " " *orb*, *nor*.
 ă " " *odd*, *forest*, *not*.
 ă " " *atom*, *carol*.
 oi " " *oil*, *boil*.
 oo " " *food*, *fool*, and as *u* in *rude*, *rule*.
 ou " " *house*, *mouse*.
 ū " " *use*, *mule*.
 ū " " *unite*.
 ū " " *cut*, *but*.
 ū " " *full*, *put*, or as *oo* in *foot*, *book*.
 ū " " *urn*, *burn*.
 y " " *yet*, *yield*.
 B " " *Spanish Habana*, *Córdoba*, where it is like
 English *v* but made with the lips alone.

ch as in *chair*, *cheese*.
 D " " *Spanish Almodovar*, *pulgada*, where it is
 nearly like *th* in *English* then.
 g " " *go*, *get*.
 G " " *German Landtag* = *ch* in *Ger. ach*, etc.
 H " " *j* in *Spanish Jijona*, *g* in *Spanish gila*; like
 English *h* in *hue*, but stronger.
 hw " " *wh* in *which*.
 K " " *ch* in *German ich*, *Albrecht* = *g* in *German*
Arensberg, *Mocklenburg*, etc.
 n " " in *sinker*, *longer*.
 ng " " *sing*, *long*.
 N " " *French bon*, *Bourbon*, and *m* in the *French*
Étampes; here it indicates nasalizing of
 the preceding vowel.
 sh " " *shine*, *shut*.
 th " " *thrust*, *thin*.
 TH " " *then*, *this*.
 zh " " *z* in *azure*, and *s* in *pleasure*.

An apostrophe ['] is sometimes used as in *tā'b'l* (*table*), *kāz'm* (*chasm*), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as *g*, *h*, *k*, *n*, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

BAZAINE, ba'zên', FRANÇOIS ACHILLE (1811-88) A marshal of France. Entering the army in 1831, he served with distinction in Algeria, in Spain, in the Crimea, and in the Italian campaign of 1859. As head of the French army in Mexico, his African training stood him in good stead. His success with the guerrilla bands, however, led him to regard his abilities at too high a rate. He quarreled with Maximilian and was believed by his soldiers to be planning to set himself at the head of an independent empire in Mexico. Whatever his plans, the attitude of the United States forced the withdrawal of the French troops, and Bazaine returned to France in 1867. At the outbreak of the great war with Germany Bazaine was at the head of the Third Army Corps, near Metz. After the battles of Worth and Spichern he took command of the main French armies, and on Aug. 14, 1870, began a retreat from Metz. Defeated at Vionville, Mars-la-Tour, and Gravelotte, he retired within the fortifications of Metz, which was immediately invested by Prince Frederick Charles. Attempts to escape failing, Bazaine capitulated October 27, when 173,000 men, including three marshals and over 6000 officers, laid down their arms and became prisoners of war. In 1873 Bazaine was tried by a court-martial and sentenced to degradation and death for having failed to do his duty. The sentence was commuted to 20 years' imprisonment. But in 1874 Bazaine contrived to escape from the fortress on the Ile Sainte-Marguerite, where he was confined, and ultimately made his way to Madrid, where he died, 1888. Bazaine was a man of great personal bravery, but unfitted by training to cope with the large situation at Metz. The rôle of politics and intrigue he played at Metz will probably never be understood, although much light has been shed on the subject by M. Émile Ollivier in vol. xvi of his *Empire Liberal*. His dilatoriness was due largely to the overcaution he observed, which, justifiable in Mexico and Africa, was unsuited to central Europe and war with Prussia. In his own defense Bazaine published *Rapport sommaire sur les opérations de l'armée du Rhin du 13 Août au 29 Octobre, 1870* (Geneva, 1871), and *Episodes de la guerre de 1870 et le blocus de Metz* (Madrid, 1883). Consult also La Brugère, *L'Affaire Bazaine* (Paris, 1874), for an official account of the court-martial, and Comte d'Héris-

son, *La légende de Metz* (Paris, 1888), for a vindication of Bazaine.

BAZALGETTE, SIR JOSEPH WILLIAM (1819-91) An English civil engineer, born at Enfield (Middlesex). He was appointed chief engineer to the London Board of Works, and as such built large portions of the embankments and sewerage systems of that city. He constructed three bridges across the Thames and also the famous embankment bordering the river. As an expert on practical questions of municipal engineering, he was well known.

BAZÁN, ba-thán', EMILIA PARDO See PARDO-BAZÁN, EMILIA.

BAZAN, ba'zan', DON CÉSAR DE See DON CÉSAR DE BAZAN.

BAZANCOURT, ba'zan'kōōr', CÉSAR, BARON DE (1810-65) A French military historian, director of the Library of Compiegne under Louis Philippe. He was born in Paris and was appointed official historiographer by Napoleon III, whom he accompanied during several campaigns. The results of these expeditions appeared in his works on *L'Expédition de Crimée jusqu'à la prise de Sebastopol, chronique de la guerre d'Orient* (1856), *La campagne d'Italie de 1859, chronique de la guerre* (1859), *Les expéditions de Chine et de Cochinchine* (2 vols., 1861-62). His other works include *A Histoire de Sicile sous la domination des Normands* (1846), and the novels, *Georges le montagnard* (1851), *Noblesse oblige* (1851), and *La princesse Palihano* (1852).

BAZAR, ba-zar', or **BAZAAR** (Ar., Hind., and Pers. *bāzār*, a market) An Oriental market, covered or open, the region of the city given up to shops. Such a market when the shops are grouped about a square is called usually a *meidan*. The bazar generally comprises a number of streets partly or wholly roofed over and devoted to shops of the better class. The shops, grouped in streets or sections according to the goods dealt in, are mere recesses with open stalls or platforms in front. In the most monumental bazars the streets are covered with vaults, perforated with numerous apertures for light. Usually there is at least a central dome. The bazar is usually one of the principal monuments of a Mohammedan city, many cities had several, Aleppo is said to have had 40. A good example is the chief bazar of Adrianople, that of Ali Pasha—a brick structure, 1800 feet \times 500 feet with a gate at each end and four side entrances, entirely surrounded by walls and covered

with vaults, making it comparatively fireproof. Of the two principal bazars in Constantinople, the oldest portion (the Bezesten in the Grand Bazar) was built in 1461, shortly after the capture of the city. The term is also applied in the East to the open-air markets or sales on special days of particular commodities, like the Monday Cloth Bazar at Constantinople in the court of the Yen-i-Jami. In English use the word is also applied to any sale of mixed goods for charitable or commercial purposes.

BAZARD, ba'zar', AMAND (1791-1832) A French Socialist and founder of Carbonarism in France. He was born in Paris, early entered the National Guard, and at the age of 25 was appointed a knight of the Legion of Honor. Shortly after the establishment by him of the Republican Society known as *Amis de la Vérité*, he organized in 1820 the famous French association of the Carbonarists, founded upon the Italian organization of the same name, but adapted to the needs of the French revolutionists. The society grew rapidly in numbers and influence, within two years after its establishment it embraced more than a quarter of a million members. In 1825 Bazard joined the St Simonists and subsequently became the principal apostle of that movement, which under his influence spread rapidly. He followed up his public career on the new gospel by the publication of the famous journal, *L'Organisateur*, issued by the followers of the St Simonist school in 1829. The chief work of the school, however, was the *Exposition de la doctrine Saint Simonienne* (2 vols., 1820-30, 1854). Bazard severed his connection with the movement in 1831 and retired from public life.

BAZARJIK, ba'zar-jek', now officially called DOBRICH. A district town of Bulgaria, about 26 miles north of Varna (Map Balkan Peninsula, F 3). It contains a mosque and a number of churches and has an important annual fair. Pop., 1900, 13,436; 1905, 15,397. The town was twice taken by the Russians, in 1774 and 1810.

BAZAS, ba'zas'. The chief town of an arrondissement in the department of Gironde, France, on the Beuve, 33 miles southeast of Bordeaux (Map France, S, D 4). It is built on a rock, rising from the river, has a cathedral and remains of fortified walls dating from the thirteenth century, and several interesting mediæval houses. It carries on a trade in cattle and white wine. Bazas anciently belonged to the Vasates, during the Religious Wars it was the scene of atrocious excesses and reprisals; on both sides. Pop., 1896, 4806; 1901, 4695; 1906, 4684; 1911, 4704.

BAZIGARS, ba'zë-gürz'. A nomadic people of India, somewhat analogous to the gypsies of Europe. They recognize caste, are largely Mohammedan in faith, and forbid intermarriage with Hindus.

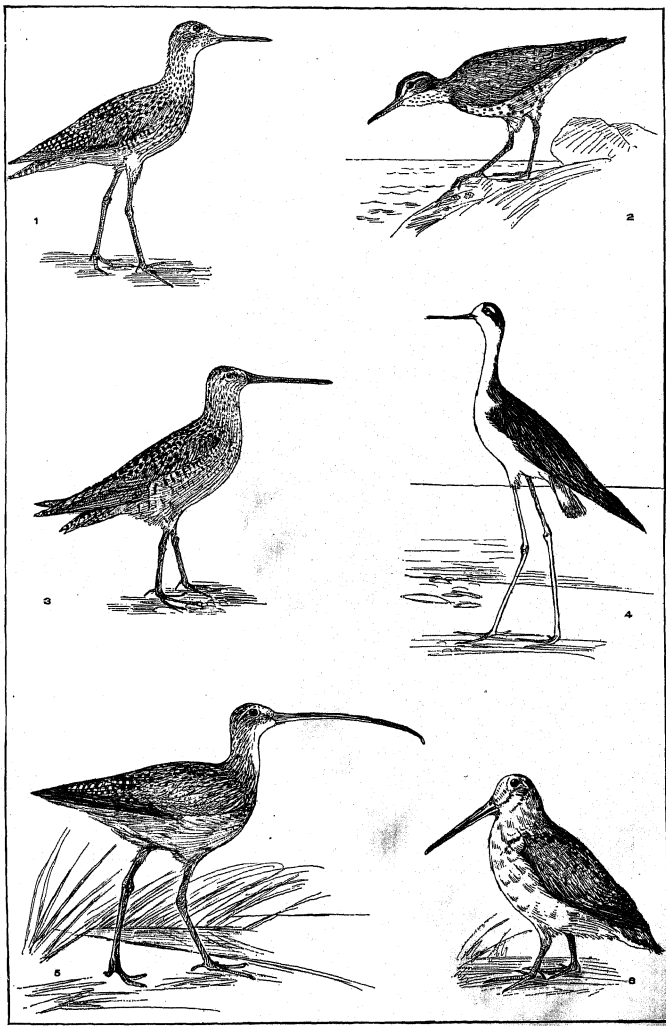
BAZIN, ba'zin', RENÉ FRANÇOIS (1853-) A French novelist, born at Angers. He studied law at Paris and in 1878 became professor on the law faculty in Angers University. He published sketches and novels laudatory of provincial life and the domestic virtues. His novels include *Stephanette* (1884); *Les Noëlets* (1890); *Madame Coennum* (1898); *Rumble amour* (1894); *De tous son côté* (1897); *La terre qui meurt* (1899); *Les Oubliés* (1901); *Donatienne* (1908). He also wrote books of travel, including *L'avenure* (1891); *Siècle* (1892); *Terre d'Espagne* (1896); and *Choc de France et d'Orient*

(1901). In 1903 he was elected to the French Academy. His later work includes *L'Ame alsacienne* (1903); *L'Isolée* (1905); *Le blé qui leve* (1907); *Le mariage de Mademoiselle Gmel* (1908, Eng. trans. 1913); *Nord-Sud Amérique, Angleterre, Corse, Spitzberg* (1913). The book by which Bazin is best known to English and American readers is that on modern Italy, rendered into English under the title *The Italians of To-Day* (1904), a careful and sympathetic study.

BAZOCHE, ba'zosh', or **BASOCHE**. A guild consisting of the clerks attached to the Parlement of Paris as well as the provincial parlements. When the French Parlement ceased to be the grand council of the King and confined itself exclusively to administering justice, a distinction of name necessarily sprang up between those noblemen who formed the royal train and the attaches of the court of justice. The former were called *courtiers*, the latter, *basochiens*. To keep up their dignity the Bazoches gathered round a mock king of their own, who resided at the Chateau des Tournelles or the Hôtel Saint-Pol. The Bazoches was divided into chapters, each wearing the livery of its captain. In Paris there were several of these chapters. Bazoches of Parlement (du Palais), Bazoches of Châtelet, Bazoches of the Chambre des Comptes, which last body took the name of "High and Sovereign Empire of Galilee." Parlements in other parts of France also had their Bazoches. Then historical existence can be traced to the beginning of the fourteenth century, when Philip the Fair conferred on the brotherhood certain privileges. The President was called King, Pivôôt, or Empereur. Henry III suppressed the regal titles, and conferred all the privileges and right attached to these offices on the chancellor. Still, the Bazoches continued to exist as a kingdom, minus its head, and effected on all occasions the language of royalty. Its jurisdiction included the consideration and decision of all processes and debates that arose among the clerks. It also caused a species of coin to be struck which had currency among its members, but, judging from the proverb about *la monnaie de basoches*, it did not enjoy an immense credit in the outer world of hard cash. The mock monarch also enjoyed the privilege of selecting at his pleasure yearly, from the French royal forests, a tall tree, which his subjects, the clerks, were in the habit of planting on the 1st of May before the grand court of the palace to the sound of tambourines and trumpets. But this was not all. In public sports this fantastic little kingdom was worthily honored, its chancellor had rooms at the Hôtel de Bourgogne, at the carnival the *basochiens* joined themselves to the corps of the prince of fools and to the performers of low farces and "mysteries." They also acted a species of satirical "morality" (see MYSTERIES), in which they made extensive use of the liberty granted to them in ridiculing vices and the favorites of fortune. Louis XII patronized these amusements. In 1500 he gave the brotherhood of the Bazoches permission to perform plays in the grand salon of the royal palace. Francis I witnessed them in 1538, but in 1540 they were interdicted. The Bazoches took an active part in the early Revolutionary proceedings, but the order was suppressed by the general decree of Feb. 13, 1791.

BAZZI, but'së', see SONOMA; IL. 11, 11.
BAZZINI, ba'tsë'në, ANTONIO (1818-97). An Italian violinist and composer, born at Brescia,

BEACH BIRDS



1. GREATER YELLOW LEGS (*Totanus melanoleucus*).
 2. SPOTTED SANDPIPER (*Actitis macularia*).
 3. DOWITCHER (*Macrorhamphus griseus*).

4. BLACK-NECKED STILT (*Himantopus mexicana*).
 5. LONG-BILLED CURLEW (*Numenius longirostris*).
 6. AMERICAN WOODCOCK (*Philohela minor*).

BDELLIUM

Italy At the age of 12 he was a successful concert performer and made many tours through Germany, France, Italy, and Belgium At 17 he was appointed organist of a church in his native town For four years, from 1843, he studied at Leipzig, devoting himself to Bach and Beethoven almost exclusively He had met Paganini when but 18 years old and became completely influenced by that master's art and style He has been classed with the Paganini school, and although criticised for mannerisms and sentimentality, was acknowledged to have brilliant technique of left hand and bow as well as great vivacity of style He was appointed professor of composition in the Milan Conservatory and director seven years later His compositions, which exhibit an assimilation of the beauties of Italian melody with the profundity and wealth of Teutonic harmony, include five string quartets, a string quintet, many compositions for the Church, an opera, *Tirandot*, produced in 1867, and a symphonic poem, *Francesca da Rimini* (1890)

BDELLIUM, δέλλι-um (Lat from Gk βδέλλιον, *bde'llion*, the equivalent of the Heb *b'dolaleh* in Gen ii 12) A gum resin, resembling myrrh High medicinal virtues were ascribed to it by the ancients, but it is no longer used The bdellium mentioned in Gen ii 12 was probably not a gum resin at all, but what it was is uncertain

BEACH, AMY MARCY CHENEY (1867-) An American composer and pianist, born at Hemen, N H After elementary instruction from her mother she studied harmony under Jumus W Hill, and piano with Ernst Persbo and Karl Baermann Advanced musical theory she studied independently, making her own translations of Berlioz and Gevaert Under her maiden name of Amy Marcy Cheney, and up to the time of her marriage to Dr Henry Harris Aubrey Beach, in 1885, she was known as a successful concert pianist, since then she has devoted herself almost entirely to composition The *Gaelic Symphony*, for full orchestra, conceded to be her best work, has been played by all the great national orchestras Of scarcely less importance is the *Sublate*, composed for the dedication of the Woman's Building, at the Columbian Exposition, a mass in E flat (Opus 5, 1892), for organ and small orchestra, a cantata for women's voices, *The Roses of Avonaton*, and *The Minstrel and the King*, a similar work for male voices, a concerto for piano and orchestra, a quintet for piano and strings, many compositions for piano, and songs

BEACH, DAVID NELSON (1848-) An American theologian, born at South Orange, N J, and a brother of Harlan Page Beach He graduated from Yale College in 1872 and from the Yale Divinity School in 1876 In the same year he was ordained a Congregational minister and became pastor at Westerly, R I He subsequently served in pastorates at Wakefield, Mass, Cambridge, Mass, Minneapolis, and Denver In 1903 he was chosen president of the Bangor Theological Seminary, at the same time receiving the chair of homiletics He took a prominent part in civic and social movements and during his residence at Cambridge was prominent in ridding that city of saloons He advocated the adoption of a modified Norwegian liquor system in Massachusetts, and became known as an enthusiastic worker for church unity and a better theology His published writings include: *Plum Words on Our Lord's Work*

BEACHES

(1886), *The Newer Religious Thinking* (1893), *The Intent of Jesus* (1896), *Statement of Belief* (1897), *The Annie Laurie Mine* (1903), *Meanings of the Battle of Bennington* (1903)

BEACH, HARLAN PAGE (1854-) An American missionary, brother of David Nelson Beach He was born at South Orange, N J, and graduated at Yale (1878) and at the Andover Theological Seminary (1883) He was missionary to China from 1883 to 1890 and at the head of the School for Christian Workers in Springfield, Mass, from 1892 to 1895, when he became educational secretary of the Student Volunteer Movement for Foreign Missions He became professor of the theory and practice of missions at Yale University in 1906 His works include *The Cross in the Land of the Trident* (1895), *Knights of the Labarum* (1896), *Dawn on the Hills of Tang* (1900), *Geography and Atlas of Protestant Missions* (1901-03), *India and Christian Opportunity* (1904)

BEACH, MOSES YALE (1800-68) An American inventor and publisher He was born in Wallingford, Conn, and in early life was a cabinetmaker He invented a rag-cutting machine for paper mills and engaged in the manufacture of paper In 1835 he acquired an interest in the New York *Sun*, a penny daily paper begun in New York about three years earlier, and soon became sole proprietor Leaving the paper to his sons, he retired in 1857 with an ample fortune

BEACH, REX (ELLINGWOOD) (1877-) An American author, born at Atwood, Mich He was educated at Rollins College, Winter Park, Fla, and later studied at the Chicago College of Law and the Kent College of Law (Chicago) It was not, however, as a lawyer that he became known, but as a writer of stories of adventure Among these are *Pardners* (1905), *The Spoilers* (1906), *The Barrier* (1907), *The Silver Horde* (1909), *Gong Some* (1910), *The Ne'er-do-Well* (1911), *The Net* (1912), *The Iron Trail* (1913) Two of these he dramatized, collaborating with Paul Armstrong in *Gong Some*, and with James McArthur in *The Spoilers*

BEACH BIRDS A collective term used by American sportsmen for such small wading birds as frequent marshy bays along the seacoast or seek their food on ocean beaches They are limicoles, such as snipes, sandpipers, willets, curlews, avocets, etc, described separately elsewhere Compare SHORE BIRDS, and see Plates of SHORE BIRDS, BEACH BIRDS

BEACHES, RAISED Tracts of ground at various elevations above the present sea or lake levels, which have evidently been beaches at some former time Such beaches owe their present position to earth movements, which may have taken place in connection with earthquakes, or as part of the general system of changes attending the development of the earth's surface It is now found that wherever the ocean waves and surf are acting upon the bolder headlands of islands or continents, the debris is being carried seaward, and a comparatively smooth floor is being formed over a belt of variable extent lying below sea level If this belt should rise suddenly, it would be recognized as a terrace of raised beach The characteristics of such beaches are first, the nearly uniform elevation of the level terrace running approximately parallel to the present shore line, second, the presence of beds of water worn and deposited material through

presence in the beds of marine or fresh-water shells belonging to species that were living at the time the sand was underneath the water. In America such beaches have been found around the coast of Maine, of California, along the west coast of South America, and the shores of many fresh-water lakes, and of Great Salt Lake.

In Scotland a terrace extends around the bold coast of the west highlands and the western islands at an elevation of about 25 feet above present sea level. The famous parallel Roads of Glenroy extend on each side of the valley of the Roy, the first pair at an elevation of 1130 feet, the second of 1060 feet, and the third of 945 feet, above sea level. These were originally supposed to be raised marine beaches, but are now considered as beaches cut by the waters of a lake which once filled the valley.

The most interesting raised beaches are those surrounding the Great Lakes of North America. A survey of these beaches, made by G. K. Gilbert, shows that they are at present not absolutely horizontal, but rise as much as 5 feet per mile as one proceeds northward and eastward, further, the southern shores of the present lakes show a tendency to flooding or drowning. This leads to the conclusion that the whole plain bearing the Great Lakes is being tilted, rising towards the northeast (north 27 degrees east) and sinking towards the southwest.

BEACHES, SINGING. See MUSICAL SAND.

BEACH FLEA, or SAND FLEA. A minute terrestrial, amputated crustacean which abounds upon seabeaches and hops away with flea-like agility when disturbed. In summer they collect in vast numbers under windrows of seaweeds, etc., where they serve as scavengers by devouring decaying animal matter. They form an important part of the food of shore birds, tiger beetles, etc. Those of the eastern United States belong commonly to the family Orchestridae. See AMPHIPODA.

BEACH GRASS. See AMMOPHILA.

BEACH PEA. See LATHYRUS.

BEACH PLANTS, also called STRAND, SHORE, or LITTORAL PLANTS. Plants that grow above the water line along the shores of oceans or great lakes. They form one of the edaphic groups of xerophytes (qv). The beach, as the term is here used, is composed of sand or gravel and is essentially a product of wave action, it comprises the zone which is, or has been, worked over by the waves. It is commonly delimited on the one side by the water line and on the other by dunes or sea cliffs. The lower portion of the beach is washed by the waves of summer storms and is devoid of life. Water plants cannot grow there because of excessive exposure, while land plants are excluded because of frequent wave action. Beyond this zone is another, which is washed by the high waves of winter storms, here annual plants are found, but not permanent perennials, since the winter waves destroy them. Beyond the reach of any but exceptional waves is the upper beach, and here the conditions for life are much improved; not only annuals, but also biennials and perennials, become more or less abundant.

The most characteristic type of beach plant is the succulent annual, of which the sea rocket (*Cakile*) may be considered a good example, since it is a common beach plant along the ocean shores of America and Europe and also along the shores of the Great Lakes. The development of succulent annuals of the beach is a fact of

great interest, since this type of vegetation is peculiarly characteristic of deserts. This suggests that the beach is a highly xerophytic habitat, and such is indeed the case, for there is no habitat in ordinary climates where the exposure to wind, light, heat, and cold is greater than here. Higher up on the beach there are often found biennial rosette plants, and perennials with long, underground stems, such as the beach pea (*Lathyrus maritimus*) and the sand reed (*Ammophila*).

The vegetation of beaches is almost always sparse. But few species can endure the severe conditions, and even in the case of these few species, the individuals are commonly scattered. As a consequence, the sandy or gravelly soil gives the dominant tone to the landscape, as is the case in deserts. A comparison of the ocean beach with the beach of the Great Lakes brings out the fact that the floras are almost identical. It might be supposed that the influence of salt (see HALOPHYTES) would be indicated by a different assemblage of plants along the seashore, but scarcely any inland and coastal plant societies are so much alike as those of lake and ocean beaches. This fact shows that the xerophytic character of the beach conditions determines the nature of its flora. See ECOLOGY.

BEACH PLUM. See PLUM, BEACH.

BEACHY HEAD (corrupted from *Fr. bel-chef, beau-chef*, beautiful head or headland). The loftiest headland on the southern coast of England, projecting into the English Channel, 2½ miles south-southwest of Eastbourne, Sussex (Map England, G 6). It consists of perpendicular chalk cliffs, 564 feet high, forming the east end of the South Downs. Near this point occurred a famous naval battle, in which the French fleet under Tourville defeated the combined English and Dutch under Torrington (1690). The Belle Tout or Beachy Head Lighthouse, 2 miles to the west, was built in 1831. This lighthouse is 285 feet above the sea, in lat 50° 44' 24" N, long 0° 12' 42" E. Its revolving light can be seen 23 miles out at sea.

BEACON (ME *becon*, AS *bedecan*, *bēcon*, Ger *Bake*, cf AS *beacman*, Eng *beck*, *beckon*, to make a sign). Any signal set upon a height, but especially the alarm fires used at one time to spread the intelligence of foreign invasion or other important event. These fire signals were in use in the earliest times. An instance is found in the book of the prophet Jeremiah, in his call (chap vi 1) to the people of Benjamin to "set up a sign of fire in Beth-haccerim for evil apprehend out of the north, and great destruction." Notices of beacons are found in the literary remains of ancient Persia, Palestine, and Greece. Another occurs in the tragedy of *Agamemnon* by the Greek poet *Æschylus*. The commander in chief of the Greek army at the siege of Troy is represented as communicating the intelligence of the fall of the city to his Queen, Clytemnestra, at Mycenæ, in the Peloponnese. The line consists of eight mountains, and the news is supposed to be conveyed from Troy in one night.

In England the beacons were kept up by a rate levied on the counties and had watches regularly stationed at them. They were carefully organized while the Spanish Armada was expected (For a vivid description of this consult Macaulay's *Armada*.) In the United States, as early as 1635, on Beacon Hill in Boston alarms were sent out by signal fires in case of attack by Indians. During the Revolution a line of signals was established reaching across New

England towards New Jersey and Pennsylvania, crossing New York at the Hudson Highlands. Two of these, above Fishkill, are now known as South Beacon and North Beacon. The latter was relighted at a celebration in 1883. In 1899 its site was marked by a monument erected by the Daughters of the Revolution.

In maritime affairs a beacon is a guide or warning signal. In former times signal fires, placed either in a cresset on top of a pole or in a tower on an eminence, were used to signal the approach of an enemy or to spread a call or warning for any purpose, a chain of them often conveying intelligence to great distances. Various hills have received the name of beacon from the fact that signal fires have at one time been lighted on them. At present lighthouses or other objects, placed conspicuously on a coast or over a rock or shoal to give notice of danger, as well as signals erected for facilitating the triangulation of the coast, are known as *beacons*. Two principal features are used for distinguishing beacons—color and shape, and the opinion given by the International Marine Conference held in Washington in 1889, was that the first object to be attained, from an international standpoint, was uniformity. For this purpose color is the best means, applying to all systems of whatever kind, while the shape admits of numerous exceptions. The color is also applicable in all countries and with little expense, whereas the immediate adoption of shape would involve changes of several existing systems. In consequence it was recommended to adopt a uniformity in color, the shape to remain optional. From an immense amount of data it was clearly shown that there has been a far greater lack of uniformity in beacons than in buoys (q.v.) and that even the different countries have not in themselves adhered rigidly to a fixed rule in the construction of beacons. Perhaps the most extensive system of day marks and beacons in use along the coast of the United States is found along the Florida reefs. There the beacons are either lettered or numbered. The cage, shaft, vane, letter, or figure is of different color in adjacent stations, so that there may be no confusion. Combinations of red, white, and black are used, and as a full description of each is to be had in the sailing directions of that section, the navigator is always able to determine his position. See LIGHTHOUSE.

BEACON HILL The hill north of Boston Common, so called from the fact that in the early history of Boston a beacon was set on it to give notice of threatened attacks by the Indians. The summit is occupied by the State House. Beacon Street, a noted residence street of Boston, extends along the slope of the hill skirting the Common and Public Garden westward through the Back Bay district.

BEACONSFIELD, bek-onz-feld. A market town of Buckinghamshire, England, 7½ miles northwest of Windsor. It was the birthplace and residence of Waller, the poet, Edmund Burke was buried in its parish church, and it gave its name to the title of Benjamin Disraeli, Earl of Beaconsfield. Pop, 1891, 1773, 1901, 1570, 1911, 2511.

BEACONSFIELD A municipality of Cape Colony, South Africa, 2 miles southwest of Kimberley, with which it is connected by tramway (Map Cape Colony, A. 7). It owes its growth and importance to the diamond-mining industry. Pop, 1881, 4259, 1891, 10,478; 1904, 9374, 1911, 14,294.

BEACONSFIELD, LORD See DISRAELI, BENJAMIN.

BEAD In architecture, a small, convex, round molding, sometimes called an astragal. It is of frequent occurrence in architecture, particularly in the classical styles. When carved into the form of a string of beads, long and short, it is called the bead-and-reel or bead-and-button molding. In woodwork any fine rounded molding is a bead, if sunk between two grooves, a sunk bead or plowed bead. The inner molding, usually gilt, in a picture frame, which mediates between the picture and the frame proper, is called a bead, whatever its section.

BEAD. A variety of personal ornament, made of various materials, as glass, pottery, metal, bone, ivory, wood, jet, amber, coral, etc., and perforated so that it can be strung on threads and made into necklaces, bracelets, rosaries, etc., or worked on cloth as a kind of embroidery. The use of beads is of great antiquity, for they are found in the most ancient of the Egyptian tombs as decorations of the dead, and beads supposed to have been used as barter by the Phœnicians in trading with various nations in Africa are still found in considerable numbers, and are highly valued by the natives under the name of "Aggry" beads. Ever since the fourteenth century the manufacture of glass beads has been chiefly engrossed by the Venetians. (See GLASS.) The manufacture is curious, the melted glass, colored or uncolored, is taken from the pot by two workmen, who slightly expand the collected mass by blowing down their blowpipes, they then open up the expanded glass and join the two together while still very soft. This done, they walk rapidly away from each other in opposite directions, in a long shed like a small ropewalk, and draw the glass, which retains its tubular character given by the blowing, etc., into rods of great length, and often extremely small diameter. On cooling, which takes place very quickly, these long rods are broken up into short lengths of about a foot, and a small number of these shorter rods are placed on a sharp cutting edge, after being annealed, and are chopped into lengths. The roughly cut beads are next mixed very thoroughly with fine sand and ashes, then put into a metal cylinder over a brisk fire, and turned round rapidly as they begin to soften with the heat. They are then agitated in water, which cleans away the sand and ashes and leaves the beads free, after which they are strung.

BEAD, BEADE, or BIDE (allied to *bīd*) A word which in Anglo-Saxon and Old English signified a prayer, and hence by extension came to mean the small perforated balls of gold, silver, glass, ivory, hard wood, etc., used for keeping account of the number of prayers repeated. A certain number strung on a thread makes a rosary (q.v.). A *bedesman* or *bedeswoman* is one who prays for another. Persons of station and wealth in old times "had regularly appointed bedesmen, who were paid to weary Heaven with their supplications." Bedesmen appointed to pray for the King and State sometimes lived together, and hence *bedehouse* is synonymous with an almshouse. A common form of signature at one time was "Your bounden bedesman," meaning "Your obedient servant."

BEADLE, be'dl. (OF *bedel*, of Teutonic origin, akin to AS *bīdel*, proclaimer, from *bīd*) Formerly an important parish officer, appointed by the vestry. He attended the vestry meetings, executed its orders, and assisted the constable in minor matters. He has been largely supplanted

by the verger, the visitor of the poor, and various petty town clerks

BEADS, SAINT CUTHBERT'S A title popularly given to the single joints of the articulated stems of encinites. The central perforation permitted them to be strung as beads, and from the fancied resemblance of this perforation to a cross, they were formerly used as *osanities* and associated with the name of St Cuthbert. They are also known as entochites, or wheel stones.

BEAGLE, be'gl (origin obscure) A breed of small-sized foxhounds, used in hare hunting, very similar to the harrier. For illustration, see DOG. See HOUND.

BEAGLE, THE A small brig of war, of 235 tons, engaged in surveying the southern coasts of South America and Tierra del Fuego and making a cruise round the world (1831-36) under command of Capt Robert Fitzroy, R.N. Charles Darwin was the naturalist of the expedition.

BEAK, or BEAK-HEAD' A brass prow fixed at the head of the ancient galleys, to pierce the enemy's vessel by ramming. The term was applied later to a small platform at the fore part of the upper deck.

BEAL, SAMUEL (1825-89) An Oriental scholar, and the first Englishman to translate direct from the Chinese the early records of Buddhism, thus throwing light also upon Indian history. He was born at Davenport and graduated from Trinity College, Cambridge, in 1847. After filling several curacies he became a chaplain in the Royal navy. He was on the *Sybilie* during the China War of 1856-58, and also visited Japan. In 1857 he printed for private circulation a pamphlet showing that the Tycoon of Yedo, with whom foreigners had made treaties, was not the real Emperor of Japan. He retired from the navy in 1877, and was elected to the chair of Chinese in the University College in London. His reputation was established by his series of works which traced the travels of the Chinese Buddhist pilgrims in India from the fifth to the seventh century, A.D. and by his books on Buddhism, which have become classics. Among his works are *The Travels of Sung-Yun and Fa-Hien* (1869); *The Catena of Buddhist Scriptures from the Chinese* (1872); *The Romantic Legend of Buddha* (1876); *Texts from the Buddhist Canon, Dhammapadam* (1878); *Buddhism in China* (1848); *Su-Yu-Ki, Buddhist Records of the Western World* (2 vols, 1884); *a Life of Buddha*, from the Chinese version of a Sanskrit original (vol xix of *The Sacred Books of the East*); and *The Life of Hsuen-Tsang* (1885), the great Chinese Buddhist pilgrim. He catalogued the set of books in the Buddhist Canon as known in Japan—a work of enormous proportions, sent to England by the Mikado's junior premier, Iwakura.

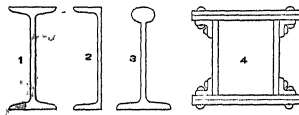
BEAL, WILLIAM JAMES (1833-) An American botanist, born at Adrian, Mich. He graduated at the University of Michigan in 1859 and at the Lawrence Scientific School in 1865, and in 1870 was appointed professor of botany at the Michigan Agricultural College. In 1881 he was first president of the Society for the Promotion of Agricultural Science. He is the author of *Grasses of North America* (2 vols, 1886-96); *The New Botany*, (1881), and *Seed Dispersal* (1898). He became professor emeritus in 1910.

BEALE, LIONEL SMITH (1828-1906). An English physiologist and microscopist. He was professor in the University of London, but resigned, in 1893. He was physician to the King's

College Hospital for 40 years and was elected emeritus professor of medicine in 1896. He has written in opposition to Darwin's theories. Among his works are *How to Work with the Microscope* (1887), *The Structure and Growth of the Simple Tissues of the Body* (1881), *Protoplasm* (1899), *Life Theories*, *Their Influence on Religious Thought* (1871), *Urinary Deposits and Calculous Disorders* (1868), *Our Morality and the Moral Question* (1886), *Life and Vital Action in Health and Disease* (1875).

BEALE, TRUXTON (1856-) An American diplomat, born in San Francisco. In 1874 he graduated from the Pennsylvania Military College, and four years later, after studying law at Columbia University, was admitted to the bar. Instead of practicing, however, he became manager of his father's ranch in California, where he remained for 13 years. In 1891 he was appointed United States Minister to Persia, and a year later Minister (afterward Envoy Extraordinary and Minister Plenipotentiary) to Greece, Rumania, and Servia. The years 1894-96 he devoted to travel in Siberia, Central Asia, and Chinese Turkestan. Many articles on international questions were contributed by him to reviews and magazines.

BEAM (AS *be'm*, Ger *baum*, tree) In engineering and architecture, a long piece of wood, stone, or metal used in a horizontal position to support a weight. Timber beams are usually rectangular in section and may consist of one large piece of timber or of several smaller pieces joined, butted, or spiked together. Beams of steel or iron may be a single-rolled steel shape, such as an I-beam, or they may be composed of a number of suitable steel shapes riveted together to form a single structure. (See STEEL SHAPES, GIRDERS.)



1, I-beam, 2, channel beam, 3, deck beam, 4, box beam

The term also has many special technical applications. In shipbuilding the beams are the strong, transverse pieces of timber, iron, or steel stretching across a ship from side to side to support the decks and retain the ship's sides at their proper distance. For this reason the term is used to denote the widest part of a vessel's hull, and *on the beam* is an expression applied to any point or object at right angles to the keel, as *on the starboard*, or *port*, *beam*, according to the side of the ship. The ends of a vessel's beams are supported by clamps and knees, and the centre by stanchions. The beams are given a crown in order that the decks may have a slight convexity to shed water. When made of wood, a *built-up beam* is formed of smaller beams, notched, scarfed, and bolted together; when of metal, it is composed of a web plate having angles or other sections riveted to it. *Cellular beams* are formed of wrought-iron plates riveted together with angle irons in the form of longitudinal cells, with occasional cross-stubs. *Composite beams* are composed of wood and metal, or of two different metals. *Keel'd beams* have slits in one side, made by saws, in order

to facilitate bending the beam in that direction. Beam also means the oscillating lever of a steam engine vibrating about a centre and forming the medium of communication between the piston-rod and the crank shaft, also called *working beam* or *walking beam*.

BEAM. The English translation for a number of Hebrew words. It refers to the beam of a building (2 Kings vi. 2, 5, 2 Chron. iii. 7, Song of Songs i. 17, 1 Kings vi. 9, and elsewhere), but in Judges xvi. 14 the reference is to a weaver's loom, as also in 1 Sam. xvi. 7. The famous passage in which "beam" occurs is in Matt. vii. 3-5 and Luke vi. 41-42. "And why beholdest thou the mote that is in thy brother's eye, but considerest not the beam (Gk. *doxos, dolos*) that is in thine own eye?" "Mote" signifies any light, dry particle, such as a dust grain or bit of straw.

BEAM ENGINE. See STEAM ENGINE.

BEAMING. A preliminary process to hand and power loom weaving, which consists in winding the warp threads on the weaver's beam, the two essential requirements being firmness in the winding and evenness in the spreading of the yarn. Beaming was a special employment followed by workmen trained to the business as beamers. See LOOM WEAVING.

BEAM TREE (*Pyrus uva*). A tree from 20 to 40 feet in height, native of almost all parts of Europe and of corresponding climates in Asia, not uncommon in the mountainous districts of Great Britain, and frequently planted. It has a straight, erect trunk, and a round or oval head, the leaves are ovate, cut and serrated (in some varieties, deeply lobed), white and downy beneath, the flowers in large terminal corymbs, the fruit scarlet, of the size of small peas. The fruit is acid and astringent, but becomes agreeable by incipient decay, it is sometimes called sorb or service berry and resembles the true service berry (qv) in quality, although it is much smaller. Beer is made from it by fermentation. Its very hard and fine-grained wood is used for cogs for the wheels of machinery. The whiteness of the foliage makes the tree ornamental in plantations. See PRUNUS.

BEAN. An annual plant of the family Leguminosae, widely cultivated for its seeds (beans) and pods, which are used as a food for both man and animals. The whole plant of some species is frequently grown for forage and green manuring. The broad bean (*Vicia faba*) is the common bean of Europe, of which the broad Windsor and Mazayan are the best-known varieties. It has been in cultivation from remote times. The plant is erect, 2 to 4 feet high, has thick, angular stems, leaves with 2 to 5 oval leaflets, flowers in clusters, generally white with black-eyed wing, pods large and thick, and beans thick, flattened, and generally angular. The varieties and subvarieties in cultivation are numerous and variable. They are grown both in the garden and field for forage and as human food. The plant is not well adapted to the hot, dry summers of either the United States or continental Europe, but succeeds well in England. It requires a heavy, rich, and well-drained soil. The Scotch, or horse bean, belongs to this species and is cultivated to a considerable extent as a forage crop. *Phaseolus vulgaris*, the kidney bean of Europe, is the common garden and field bean of the United States. It was introduced into Europe in the sixteenth century, probably from South America. New varieties of this species are easily originated, and several hundred dis-

tinct varieties are grown throughout the world. Kidney beans are commonly divided into two groups—green-podded and wax-podded. There are bush and pole varieties of each group. Practically all of the wax-podded beans, and many of the green-podded beans are eaten as snaps or string beans. Several varieties of the green-podded group are extensively grown as field crops, and the product is sold as dry beans. They may be planted either in hills or drills after all danger of frost is past, and require a warm, loose soil.

The Lima bean (*Phaseolus lunatus*) is a climbing species of South American origin, bearing very flat, broad pods, with short, flat seeds, slightly kidney-shaped. It is grown to a limited extent in various parts of the United States, and especially in California, where most of the seed is now raised. Some bush Limas have been developed in recent years. The soy bean (*Glycine hispida* or *Glycine soja*) is the common bean of China, Japan, and India. It is grown in Europe, and in some of the Southern and Southwestern States to some extent as a forage and soiling crop. (See SOY BEAN.) The cowpea (*Vigna unguiculata*) belongs to the bean family. It is the chief forage, soiling, and green manure crop of the southern United States, where the beans are also frequently used as food. (See COWPEA.) The scarlet-runner bean (*Phaseolus multiflorus*) is an ornamental climber which is also largely grown as string and green-shell bean in Europe, especially in England, where the Lima cannot be successfully grown. The frijole (*Phaseolus* spp.) is a small flat bean, raised in the southwestern United States, as well as in Mexico and other Spanish-American countries, where it ranks next to maize as a staple food. The tepary (*Phaseolus acutifolius latifolius*), a small variable bean which has long been grown by Indians in the same region as the frijole, has recently proved to be especially adapted to the exacting climate of the Southwest, and much more prolific than the frijole. Other beans, grown to a considerable extent in Oriental countries, but rather uncommon elsewhere, are the Lablab bean (*Lablab vulgaris*), asparagus beans (*Vigna sesquipedalis*), Mungo beans (*Phaseolus mungo*), and locust or carob beans (*Ceratonia siliqua*), grown in the Mediterranean region as a cattle food. The velvet bean (*Mucuna utihis*, now *Strobelobium* spp.) has lately come into cultivation in a number of Southern States as a forage crop and soil renovator. It has about the same feeding and fertilizing value as the cowpea. The velvet bean does not ripen its seeds north of Florida and the Gulf-coast States. For illustration see LEGUMES.

Feeding and Food Value. The ripe seeds of the bean are used to a limited extent in the United States as a feed for farm animals, while the whole plant is sometimes used as forage. In bean-growing districts the culls (which are not of good enough quality for human food) can usually be purchased at a low price and are a cheap feed, as they are rich in protein matter.

In Europe horse beans are frequently fed to horses, especially to those required to perform long-continued or severe labor. Sheep are fond of raw beans. For other farm animals, it is stated, beans may profitably be cooked. Beans are suitable for combining with corn or other grain rich in carbohydrates. Like other leguminous crops, bean forage is comparatively rich in proteins.

As a food for man, beans are extensively used

green or dry, or as the young tender pod, which, in many varieties, has little fibrous matter and is eaten with the seeds as string beans. Dry shelled beans have the following percentage composition: water, 12.6, protein, 22.5, fat, 1.8, carbohydrates, 59.6, mineral matter, 3.5. The fuel value per pound is 1605 calories. Fresh-shelled beans contain 58.9 per cent of water. String beans contain water, 89.2, protein, 2.3, fat, 0.3, carbohydrates, 7.4, mineral matter, 0.8 per cent, the fuel value is 195 calories per pound. The Windsor bean is used green or ripe, being the common bean of many regions of Europe. In America the navy or kidney is the bean most commonly used green or dry. Most of the varieties of string beans belong in this class. The Lima beans are of excellent flavor and quality, and are favorites, green or dry. The asparagus bean is becoming favorably known as a string bean.

Green shell beans and string beans are usually cooked in water, and prepared and served in a variety of ways. Dry beans are used for soups, purees, "baked beans," and other dishes. To develop their flavor long cooking is desirable. Judged by their composition, fresh beans compare favorably with other green vegetables. Dry beans are certainly a very nutritious food, being especially rich in protein, and thus fitted to replace meat to some extent in the diet. Taking into consideration the high food value of beans, their cost is usually low. It must be remembered, however, that, if eaten in large quantities, beans are less thoroughly digested than cereals, although usually well assimilated. Owing to the production of methane by fermentation in the intestines, beans are liable to cause flatulence.

Beans are sometimes ground to "bean flour." Large quantities of string beans and shell beans are dried by evaporation or canned. Cooked dry beans are also canned. String beans are sometimes preserved with salt, and allowed to undergo a peculiar process of fermentation.

The frijole is used green or dry. The dry bean is cooked in a variety of ways and is often highly seasoned with chiles. The pods of the locust or carob bean are often sold by confectioners under the name of St. John's bread. The seeds of this bean are surrounded by a sweet mucilaginous pulp, which is eaten to a considerable extent, especially in the Mediterranean region, as are also similar portions of the pods of the honey locust (*Gleditsia triacanthos*), soy beans (qv), and cowpea (qv). See CAROB.

Bean Diseases. The principal fungus disease to which the bean is subject is known as anthracnose, and is caused by the fungus *Colletotrichum lindemuthianum*. The fungus attacks stems, leaves, and pods of the bean, its presence being most conspicuous upon the pods, in which it causes deep, dark pits, seriously depreciating their value. The disease may be carried from one crop to another through the seed. Infected seeds are wrinkled and discolored, and all such should be rejected, as plants growing from them are sure to be affected, and they may convey the disease to otherwise healthy plants. Various treatments have been suggested for combating bean anthracnose, but careful selection of seed will probably give the most satisfactory results.

A rust of bean leaves, caused by *Uromyces phaseoli*, is sometimes troublesome, causing injury by defoliating the plants. The first appearance of rust may be recognized by small, nearly circular brown dots, which contain a brown

powder, the spores of the fungus. Later the spots are larger and the spores black. The liberal use of Bordeaux mixture (see FUNGICIDES) will prevent this disease. A mildew of Lima beans, due to *Phytophthora phaseoli*, is sometimes destructive. Loss of the crop may be prevented by the use of suitable fungicides.

BEAN, SAINT IGNATIUS. See STRYCHON.

BEAN, TARLETON HOFFMAN (1846-) An American ichthyologist, born at Bamberbridge, Pa. In 1892 he became associated with the United States Fish Commission. From 1880 to 1895 he was curator of fishes at the United States National Museum and from 1895 to 1898 was director of the New York Aquarium, which he organized. He was the commissioner in charge of fishes at the World's Columbian Exposition, 1893, at the Atlanta Exposition in 1895, at Paris in 1900, and chief of the departments of fish, game, and forestry at the Louisiana Purchase Exhibition, 1905. He published, with G. Brown Goode, *Oceanic Ichthyology* (1896), also descriptive lists of the fishes of New York, Pennsylvania, and other districts, and many contributions to government reports.

BEAN FEAST, also called **WAYZ GOOSE.** The English custom of an annual outing and dinner of workmen. It is either given by the employers or subscribed for by the workmen themselves. The name or names are possibly derived from the fact that beans, or a bean goose, figure prominently in the repast.

BEAN GOOSE. The small gray goose of Great Britain and northern Europe. See GOOSE.

BEAN KING'S FESTIVAL. A social rite observed principally in France, from which country it would seem to have been transplanted to Germany. On the evening of Twelfth Day, the Feast of the Epiphany (January 6), companies assemble to spend a few hours in mirthful relaxation. A large cake is baked, with a bean hidden somewhere in it. The cake is then divided into pieces, each person present receiving one, and whoever obtains the piece with the bean is king for the year. In this capacity he holds a mock court and receives the homage of the company, who amuse themselves also with other diversions. The Bean King, however, is compelled to pay for his dignity, for he has to give an entertainment on the next Twelfth Night, that an opportunity may be afforded to choose another king. In France this custom was, at an earlier period, so common that even the court indulged in it, although the Church, in the seventeenth century, excited itself zealously for its suppression. It has left a trace in the popular expression for a lucky man, *Il a troué la fève au gâteau* ('He has found the bean in the cake'). The theory that the Bean King's Festival owes its origin to the Roman saturnalia, when even the children partaking in the universal gloom were wont to elect a king, appears quite plausible.

BEAN TREE. See LABURNUM.

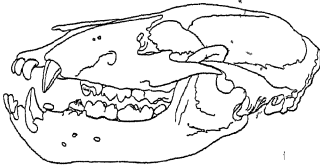
BEAN WEEVIL. A small, dark-colored downy beetle (*Breuchus fabae* or *obtectus*), which infests dried beans. The eggs are deposited on the young bean pods. This beetle continues to breed also in dry stored beans. It is therefore necessary to treat weeviled beans with binaphthide or carbon or hot water before storing them away. See WEEVIL.

BEAR, bär (AS *bēra*, Ger *Bär*, possibly akin to Lat *fera*, wild beast, GK. *φῆρ*, *phēr*, beast, Skt *bhalla*, bear). A large, shaggy plantigrade beast of prey, representing the carnivorous family Ursidae. Bears are native to all the wilder

parts of Europe, Asia (with its closely adjacent islands), North America, and the Andean region, but are absent from Africa, except the Atlas Mountains, and Australasia. As they thrive in confinement, they have always been familiar objects in menageries, and are thus among the best-known of beasts.

Characteristics Most bears are bulky, and some exceed in size any other carnivore, but this appearance of bulk is largely due to the looseness of the skin, the length of the coarse fur of their coats, the rudimentary tail, and the comparative shortness of their legs, the whole sole of the foot being pressed to the ground, instead of the toes only, as in most carnivores. In their relationships they stand between the dogs and the fur bearers (*Mustelidae*), but their nearest relatives are the raccoons. Their fossil ancestry is largely represented, and may be traced back to generalized forms in the early Tertiary, whence both dogs and bears seem to have descended by divergent lines.

The bear's head is broad and massive, with extended and somewhat pointed jaws, well furnished with teeth, but lacking the muscular power possessed by dogs. They have 6 cutting teeth above and 6 below, 1 canine tooth on each side in each jaw, with 4 false molars and 2 molars (or grinders) on each side above, and 4 false molars and 3 molars below. The false molars in general are soon shed. The true molars are very large, and have tuberculous



TEETH OF THE BEAR

Skull of a young grizzly, showing characteristic dentation

crowns suitable for grinding the vegetable food which forms a large part of their fare, and which the loose articulation of the jaw permits. The skeleton is massive and the muscles "plated" and of very great length, while the feet are armed with powerful claws adapted to digging in the ground and to moving or tearing pieces of logs or rocks. All but the heaviest bears are able to climb trees. Their ordinary movements are slow and rather clumsy, yet, when impelled by rage or fear, they will run for a short distance upon level ground with a speed that taxes a horse to follow and will make them way over rocks, rough ice, or up and down steep declivities, or among trees, with surprising quickness and agility. Their eyes are small, and their eyesight is probably not very effective, but their hearing, though the ears are externally small, round, and furry, is acute, and their sense of smell is keen. Unless provoked or fearful for the safety of their young, they are not usually aggressive in disposition, but are likely to display curiosity, rising upright upon their hind legs and surveying the intruder calmly. They are rarely cowardly, and when angered or brought to bay will defend themselves or attack most fiercely, seeking to strike

their enemy down or to seize him in a crushing hug and tear him to pieces with their teeth. The larger northern bears are therefore justly regarded as very dangerous beasts.

Food and Reproduction Bears are adapted by their teeth and digestive organs to a wide variety in food, and no animal is more omnivorous. Besides the flesh of such animals as they can capture, including pigs, calves, colts, and sheep, they eat fish (the chief diet with some species) and reptiles. They are also fond of fruits, berries, bulbous roots, leaves, herbs, grass, and birds' eggs, and of insects and honey, for which they will dig up ant hills and tear to pieces bees' nests and logs. They require an abundance of water and are not loth to enter it, some species being remarkably strong swimmers. They go about in pairs, or sometimes in small bands, and are diurnal rather than nocturnal in their habits, though often abroad at night. Each family has some sort of lair in a cave, dense thicket, or some similar place, varying with the circumstances, and there, in the early spring, are brought forth from one to four (usually two) young, which will remain with the mother until fairly well grown. The period of gestation is about seven months. In cold countries the birth of the young finds the mother still in hibernation, which is more or less complete for all the northern species, according to the degree of cold and the amount of snow, which prevents their seeking or obtaining much food. Hence, when they come out in the spring, they are likely to be thin and weak. The voice of bears is expressed in whines and coughing growls.

Fur The skin of bears forms a fur pelt useful for robes, overcoats, and rugs, and increasing in value with its growing rarity. A complete and ornamentally mounted skin, in the form of a rug, is worth in New York from \$75 to \$1000 for that of a polar bear, \$100 to \$500 for a grizzly, and \$50 to \$250 for a black or brown bear. The flesh is good food, the fat is valuable for the unguent called bear's grease, and the teeth and claws are turned into ornaments by civilized as well as savage artisans.

Classification The classification of bears is not yet satisfactorily determined, for several so-called species of wide distribution vary and blend confusingly. Dr C Hart Merriam, of Washington, is at work upon a monograph of American bears of the most elaborate type, which, when published, will greatly add to our knowledge, taxonomic and otherwise, of these animals. The following are the leading species and groups of the bears of the world: Polar Bear of circumpolar distribution, Brown Bear of northern Europe and Asia; Himalayan Black Bear, Japanese Bear, Sloth Bear and Sun Bear of the Old World, Spectacled Bear of South America, Big Brown Bears of North America, represented by the Kodiak Bear and Peninsula Bear, Grizzly bears of North America, represented by the Sitka Grizzly and the Sonora Grizzly, and the Black bears of North America, represented by the common Black Bear and Glacier Bear. See PLATE of BEARS.

The POLAR, WHITE, or ICE BEAR. The Polar Bear (*Ursus*, or *Thalassarcus maritimus*) is an inhabitant of the entire Arctic regions, where it seems to be extremely numerous upon all coast and islands, and may wander a vast distance from land upon the ice, or even by swimming for it has been encountered in the open sea-man;

miles from shore, and sometimes drifts a long way south on ice floes. In color it is creamy white, with black claws, and the color does not change to white in winter, as is the case with most Arctic animals. It is one of the largest of bears and has an elongated neck and straight head, so that specimens may exceed 9 feet from nose to tail. Its limbs are comparatively slender, its feet disproportionately long and hairy upon the soles, giving it a firm hold upon the ice and power in swimming. Its food is mainly seals, which it captures both on land (or ice) and in the water with great activity and cunning, but it also feeds upon such fish as it can catch in shallows or find dead, and in summer it regales itself on marine grass. Its sense of smell enables it to detect concealed food, and Arctic travelers find it difficult to build "caches" strong enough to withstand its efforts. Although a dweller in the coldest and most wintry part of the globe, this bear is abroad at all seasons, and brings forth its young in no better chamber than a cavern scratched in the snow, which may cover the mother and her nursing young for many days before she is able to lead forth the cubs.

The "EUROPEAN" BROWN BEAR (*Ursus arctos*) has been well known in captivity, as well as wild, ever since the days of the Roman arena, and it is still a resident in every "zoo" and the docile companion of wandering "bear tainers." It survived in Great Britain until nearly the twelfth century and is still to be found in the Pyrenees, eastern Alps, and thence through Russia, Syria, and Central and northern Asia to the Himalayas and Kamtchatka. It is probable, also, that the so-called barren-ground bear of the Hudson's Bay region and the great brown bears of Alaska (see below) are geographical races of this species, of which, also, the almost white Isabelline, or snow bear, of the Himalayas, and the Syrian bear (mentioned in the Bible and still ranging the mountains of Palestine) are local varieties. Everywhere it is a solitary denizen of forests and mountains, affording good sport in Europe, and of great service to the barbarians of northeastern Asia, who depend largely upon it for food and clothing. It is too well known to require particular description. For its history as an object of ancient sport and its employment in "bear baiting," etc., consult Harting, *British Animals Extinct within Historic Times* (London, 1880).

The HIMALAYAN BLACK BEAR (*Ursus torquatus*) and the JAPANESE BEAR (*Ursus japonicus*) are rather smaller species, usually glossy black. They resemble the American black bears and are held in high respect by sportsmen.

The SUN BEAR, or BRUANG (*Ursus malayanus*), of the Malayan Peninsula, Java, Sumatra, and Borneo, represents a distinct genus (*Helarctos*), in the view of many students, which is known also by several fossil species, including the huge CAVE BEAR (*Ursus spelæus*) of ancient Europe, supposed to have been exterminated by prehistoric man. The size is much less than that of either the brown or the sloth bear, the head broad and short, the fur short and close, and the tongue and lips are remarkably strong and flexible. With this go very long, strong claws, fitted for tearing to pieces ant hills and other insect retreats, whose inhabitants are easily gathered by means of the extensible, glutinous mouth. It inhabits dense mountain jungles and climbs expertly. Its color is black, marked with a white crescent (orange in the Bornean variety) on

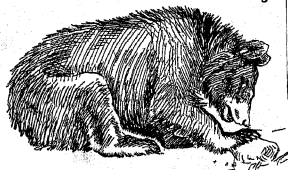
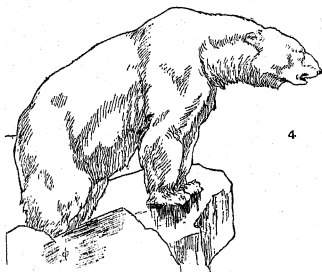
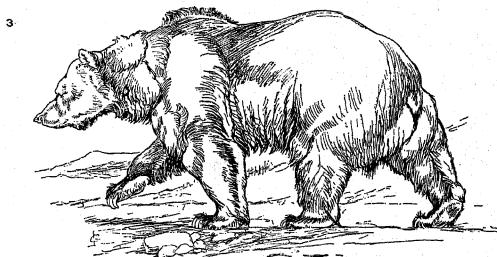
the breast. It is peaceably inclined but fierce and aggressive when brought to bay, rising upon its hind legs and attacking with its long, sharp claws, but taken young, or bred in captivity, it becomes an amusing and somewhat intelligent ally of the showman. One kept as a pet by Sir Stafford Raffles, the most prominent of the early English governors and describers of Malaya, has become famous in ursine chronicles.

The ASWAIL, SLOTH BEAR, or HONEY BEAR (*Ursus*, or *Melursus*, *labiatus*) is a species inhabiting the jungles of all peninsular India and Ceylon, and is the juggler's bear of that region, where its facial grimaces and generally comical appearance are of great service to the wandering showman. This wantonness of countenance is due to the toothless condition of the front of the gums, where the incisors are lost in early youth, and to the fact that the lips are very long, and they and the whole snout are soft, extensible, and mobile to a surprising degree. These and other features are so pronounced that this bear has been separated in the genus *Melursus* by most students. It is submissive and teachable in captivity; but in freedom, when it habitually makes its home in some rocky cave in the jungle, it is brave and held in much respect by hunters. Its size equals that of the brown bear, yet it climbs about fruit trees with great ease. Its fur is peculiar, long, shaggy, and unkempt, remotely suggesting that of a sloth, and black in color, except for the whiteness of the muzzle and space about the eyes and a conspicuous V-shaped white mark on the breast. It seems to eat very little flesh, but lives mainly on fruit and insects, especially ants, termites, and the combs of honeybees, in securing which its extensible lips and tongue find their special use, hence the term "honey bear."

The AMERICAN BEARS are confusingly alike, and conservative naturalists have heretofore been unwilling to admit the reality of so many species as are distinguished in the list below. Some even question whether the Spectacled Bear (*Ursus ornatus*) of the high forests of the central Andes be not merely an isolated subspecies of the black bear, distinguished by its small size and the yellowish, goggle-like rings around its eyes. The latest account of the North American Ursids makes the following list of species, following the views of Dr. C. Hart Merriam: Grizzly Bears, *Ursus alascensis*, *californicus*, *horricus*, *horribilis*, *phoeniceus*, and *richardsoni*; Brown Bears, *Ursus dalii*, *enotopus*, *gyas*, *iscariensis*, *kradleri*, *midclendorfi*, *sheldoni*, *sitchensis*; Black Bears, *Euarctos alifrontalis*, *amblyceps*, *americanus*, *carlottæ*, *emmonsii*, *eremicus*, *floridanus*, *luteolus*, *Polar Bear*, *Thalassarctos* or *Thalarctos maritimus*.

The KODIAK BEAR attains the largest size of all known bears, and is the most bulky of carnivores, specimens not regarded as the heaviest having weighed 1200 pounds, many, however, are comparatively small. This huge species was discovered to science about 1895, on Kodiak Island, Alaska, where it is said to be numerous, but hard to get; and it is also believed to range the forested mountains of the neighboring mainland. It seems to subsist mainly on fish, which it scoops from the water with its paws, especially at the season when the streams are filled with salmon and other species ascending them to spawn. In color this bear "varies greatly among individuals, being of various shades and combinations of dark and yellowish browns." Dall's,

BEARS



1. INDIAN SLOTH BEAR (*Melursus labiatus*).
2. MALAYAN SUN-BEAR (*Ursus malayanus*).

3. GRIZZLY BEAR (*Ursus horribilis*).
4. POLAR BEAR (*Thalassarctus maritimus*).
5. AMERICAN BLACK BEAR (*Ursus americanus*).

or the Sitka Bear, seems separable from the Kodiak by points of skull-structure. It inhabits the Alaskan coast country, between Copper River and Baranov Island.

The GRIZZLY BEAR of western North America is perhaps, on the average, the largest, and certainly is the most formidable, of the family. It is justly regarded by sportsmen as the most dangerous beast in America, and at close quarters is the equal of any elsewhere in its reckless courage, muscular power, and ability for offense, the name *horribilis*, however, was a mere translation by Ord of his "grisly" into Latin and refers to color, not to character. When the mountain men speak of it as "Old Ephraim," they pay the respect of knowledge to power. Its range, before the encroachments of civilization, was northern Mexico to the Arctic Circle, and from the Pacific coast eastward into the plains east of the Rockies as far as circumstances favored, probably as far as the great bison herds were wont to travel, but everywhere it preferred forests. It is still to be found throughout the higher parts of the Rocky Mountains and the Sierra Nevada, increasing in frequency towards the north and reaching its acme of both size and numbers in Alaska. The size varies greatly, but a length of 9 feet and a weight of 1000 pounds are given as dimensions reached by many specimens. Their color is equally variable, the typical form being described by Elliot as "usually brownish yellow, with a blackish dorsal stripe, mane reddish brown, darkest near tips of hairs, which are brownish yellow or brown, legs generally black or blackish brown." Some specimens ("silvertips") are prevalently light gray, due to the points of the hairs being white, others ("cinnamons") are warmly reddish, and others nearly coal black. Their habits and methods of life seem as diverse as their appearance and habitat.

These great bears hibernate little, if any, and are abroad by day as well as by night, range the heated plains and jungly valleys or climb to the snowy peaks with equal ease. Often they go alone, but frequently travel in pairs or gather in small herds. One striking peculiarity, due, perhaps, to the great weight, is that they never climb trees, even as cubs. Nothing edible comes amiss as food. In former days they seized upon the stupid buffalo and were able to vanquish even the heavy bulls by the weight and tearing power of their mighty paws, and in these days range cattle are frequently destroyed, while those of the northwest coast region are expert in scooping up fish and subsist largely on salmon and the like. All are fearless of water. Although so terrible when enraged, there is no evidence that the grizzly is more quarrelsome than other species, and the tales of an undying feud between it and the black bear or the puma are largely romances. The attitude of these bears towards mankind cannot be stated dogmatically, nor foreseen in any particular instance. They may quietly withdraw or run away in a panic (as the present writer has known them to do), or stand their ground without aggression if let alone, on the other hand, many a man has lost his life by a totally unexpected and terrifically impetuous attack. Says J. H. Porter (*Wild Beasts*, 1894, p. 371), in a wise summary:

"No writer of any note except General Marcy has, as far as the author knows, denied that a grizzly bear soon comes to bay, and that he then

devotes his energies to destruction with entire single-mindedness. Those who have met him, alike with those who have acquainted themselves with any completeness with the observations of others, know that this brute's patience under aggression is of the briefest, and his inherent ferocity easily aroused. When it is injured, the animal is exceptionally desperate, and fights from the first as a lion, tiger, and jaguar are apt to do only in their death rally. Colonel Dodge expresses the best opinions upon this point in saying that 'when wounded, a grizzly bear attacks with utmost ferocity, and regardless of the number and nature of his assailants. Then he is, without doubt, the most formidable and dangerous of wild beasts.' 'In some way it has come about,' says Lockwood, 'that Bruin has secured for himself an almost superstitious respect.' The way he did so has just been mentioned. Men had reason to fear him, and their veneration followed as a matter of course. It was because he proved 'most formidable and dangerous' that Schwatka found among the Chilkat Indians the highest clan called brown bears, and for a like reason the native warrior wore his claws as a badge of honor. Ferocity, prowess, and tenacity of life appear most conspicuously in accounts of actual conflict. Enough has been said with respect to the first-named trait, and no one ever called the others in question."

The Indians and early hunters captured the animal in pitfalls and very strong traps, or worried it to death by numerous shots. A single bullet fortunately planted in heart or brain may overcome it, but it has been known to survive many heavy balls. It remains one of the prime objects of sportsmen's ambition, and one of the most valuable prizes of the professional hunter, since its pelt, when in good condition, will bring a large price in the market.

These remarks apply in a greater or less degree to the Alaskan bears already mentioned, and to the Barren-ground Bear, a smaller, whitish-brown form inhabiting the treeless regions between Hudson's Bay and the Coppermine River, whose separate specific identity is still subject to discussion.

The BLACK BEAR remains to be described. It is more widespread than any other in America, being found primitively wherever forests existed on the continent north of Mexico. Civilization has restricted this area of residence, yet these bears remain wherever any considerable tracts of forest exist and are frequently a pest to farmers by their forays upon the pigsty and sheepfold. Their size varies, but never reaches the bigness of the grizzly, the color seems normally black, but varies through brown and reddish to yellow. Some so-called "cinnamon" bears are of this species, and some are grizzlies. Their habits and food are closely similar to those of the European Brown Bear. They climb trees easily, are courageous, and may be very ugly customers when brought to bay, but are not often aggressive towards men. Those of Texas and Florida are by some regarded as separate species.

Possibly this is equally true of the small GLACIER BEAR, first described in 1895, which inhabits the St. Elias Alps of the central coast region of Alaska, but this will probably be found a tenable "species." It is smaller than the average of black bears, and unique in its color, which is hoary gray, closely resembling that of a silver fox, most nearly white on the under surfaces. The fur is not very long, but remarkably soft,

and with a rich under fur of a bluish-black shade, numbers of the long hairs being white" or white-tipped. The sides of the face are bright tan, and the claws are small, much curved, sharp, and black. Little is known as yet as to the special habits or food of this interesting little bear.

Bibliography. In addition to standard works, consult Mivart, *Proceedings Zoological Society of London* (London, 1885), Blanford *Fauna of British India Mammals* (London, 1888), Pollok, *Sport in British Burma* (London, 1879), Hornaday, *Two Years in the Jungle* (New York, 1886), Baker, *Wild Beasts and their Ways* (London, 1890), Sanderson, *Thirteen Years among Wild Beasts in India* (London, 1893), and other books of East Indian travel and sport, Reid, *Bruin, or the Grand Bear Hunt* (London, 1860), Richardson, *Fauna Borealis Americana* (London, 1837), and Arctic explorations generally for the polar bear, Roosevelt, *The Wilderness Hunter* (New York, 1893), Proctor, *Wild Beasts* (New York, 1894), Ward, *Century Magazine*, vol. 1 (New York, 1882), Merriam, *Proceedings Biological Society of Washington* (Washington, 1896), Seton, *Life Histories of Northern Animals*, vol. 11 (New York, 1909).

BEAR ANIMALCULE, or WATER-BEAR. See TARDIGRADA.

BEAR BAITING. A sport which consisted of setting a pack of dogs upon a bear, which was usually tied to a stake. It was an established amusement in many countries. In England it was known as early as the reign of Henry II, but was prohibited by Parliament in 1835. Queen Elizabeth not only allowed them the benefit of her royal patronage, but attended the bear baitings in person. The Puritans hated the sport, "not because it gave pain to the bear," as Macaulay has recorded, "but because it gave pleasure to the spectators," and it was suppressed during the period of Puritan rule, 1649-60. The places where bears were kept and publicly baited were called bear gardens. "Looks like a bear garden," is a common English expression used to this day to designate any disarranged or ill-kept room or grounds.

BEAR/BERTY. See ARCTOSTAPHYLOS.

BEARD. The hair which grows on the chin and cheeks of men. The beard is the distinctive sign of manhood, although exceptional instances occur of women with beards equal to those of men. The presence of the beard is the ethnological characteristic; it is found especially luxuriant among the Celtic and Slavic races, and scarcely at all among the North American aborigines, who customarily eradicate the few hairs which grow on their faces. It is usually the same color as the hair on the head, although shorter, stronger, and more wiry. In early times the beard was considered by almost all nations as a sign of strength and manhood, and was carefully cherished as being almost sacred. Its removal was regarded as a degrading punishment (See 2 Sam x, for the case of David's ambassadors). The Moslems have habitually observed a great care of the beard, carrying combs about with them for the purpose of dressing it. It is their custom to do so immediately after prayers, while still on their knees, the hairs that fall out are carefully picked up and preserved for burial with their owners. The practice of dyeing the beard was common among the Arabs and Persians, the former usually dyed it red, not only because dye of that color (be-

ing merely a paste of henna leaves) was easily obtainable, but because it was an approximation to golden yellow, the color recommended by Mohammed, who hated black, the color preferred by the Persians. The Egyptians commonly shaved their beards, except in time of mourning, and an unkempt, neglected beard was also a sign of grief among the Jews. In Greece the beard was universally worn until the time of Alexander the Great, who ordered his soldiers to shave, that their enemies might not seize them by the beards in battle. Shaving was introduced among the Romans about the same time. Pliny says that Scipio Africanus was the first Roman who shaved every day. Subsequently, the first day of shaving (generally the twenty-second birthday) was regarded as the entrance upon manhood and celebrated with great festivities. From the time of Hadrian to that of Constantine, the beard was again commonly worn. The ancient Germans, according to Tacitus, regarded a clean-shaven face as a sign of servitude, and the Lombards (Longobards) received their name from their long beards. The beard was commonly worn in France until the time of Louis XIII, when, the monarch being young and beardless, the fashion changed. French fashions in the matter have, in fact, usually followed that set by the monarch—an illustration of which is preserved in the English word "imperial" for the little tuft on the chin. In like manner the loyal Spanish courtiers removed their beards on the accession of Philip V, who was unable to grow one. Peter the Great compelled shaving in Russia by positive enactment, imposing a tax on beards in proportion to the rank of the wearer. A similar tax was for a while imposed in England under Henry VIII and Elizabeth, but fashion proved rebellious here, and the latter reign, with that of James I, was distinguished by a fantastic extravagance which clipped the beard into as many formal shapes as the old-fashioned box hedges. The Vandeyke beard, familiar to us in the portraits of Charles I, characterized that period, but in the eighteenth century the smooth face became usual, so continuing until comparatively recent times. In fact, the wearing of a beard was regarded in the early part of the nineteenth century as a symbol of dangerous and revolutionary opinions, and as such was restricted by the police regulations of some European countries. The Roman Catholic clergy in modern times, although most of the medieval Popes wore beards, are obliged to shave—an exception being made in the case of missionary orders and of a few individuals who receive special permission for reasons of health. Those of the Greek church have constantly worn full beards since the middle of the ninth century. As a general rule, the wearing of beards is discouraged by army regulations, and favored in the navy, but climatic conditions or assignment to exceptional duty may modify this rule.

Physicians recommend that the beard should be allowed to grow on the chin and throat in cases of liability to disease of the larynx or bronchial tubes, because of the unavoidable removal of cuticle in shaving the throat. The beard itself is liable to the same diseases as the hair, and, to a peculiar disease called "barber's itch" (q.v.). Consult Philippe, *Histoire philosophique, politique, et religieuse de la barbe* (Paris, 1845). See BARBER.

BEARD, CHARLES AUSTIN (1874—) An American political economist and educator, born

at Knightstown, Ind. After graduating from DePauw University in 1898 he took advanced work abroad at Oxford and in this country at Cornell and Columbia. Having received the degree of Ph.D. from Columbia in 1904, he became, three years later, a member of the faculty of that university, and was appointed, first, adjunct professor, then (1910) associate professor, of politics. His published writings include *The Office of Justice of the Peace* (1904), *Introduction to the English Historians* (1906), *Development of Modern Europe*, with J. H. Robinson (2 vols, 1907), *Readings in Modern European History*, with the same (2 vols, 1908-09), *Readings in American Government* (1909), *American Government and Politics* (1910), *Digest of Short Ballot Chapters* (1911), *American City Government: A Survey of Newer Tendencies* (1912), *The Supreme Court and the Constitution* (1912), *Economic Interpretation of the Constitution of the United States* (1913).

BEARD, DANIEL CARTER (1850-) An American artist, author, and naturalist, born in Cincinnati, Ohio. His academic education he received at Covington, Ky., and his art training (1880-84) at the Art Students' League in New York City. For many years he made illustrations for leading magazines, and he also illustrated many books, of which the most notable is Mark Twain's *Connecticut Yankee at the Court of King Arthur*. He was the originator and first instructor of the pioneer class in illustration, and was teacher of animal drawing at the Woman's School of Applied Design. In 1905-06 he was the editor of *Recreation*. An enthusiast in outdoor life, he instituted what later became an international movement when he founded the first Boy Scouts' Society in the United States. The Boy Scouts of America (qv.), an outgrowth of the early organization, chose Beard as its national commissioner. He is also credited with the discovery of a mountain, which has been named for him, adjoining Mount McKinley. He became a member of several zoological societies and was chosen president of the Society of Illustrators and of the Camp Fire Club of America. Besides many articles on nature subjects and sporting, his writings include *American Boys' Handy Book* (1882, 1903), *Moonlight and Six Feet of Romance* (1890), *Jack of All Trades* (1904), *Field and Forest Handy Book* (1906), *Boy Pioneers and Sons of Daniel Boone* (1909), *Boat Building and Boating* (1912).

BEARD, GEORGE MILLER (1839-83) A celebrated American neurologist. He was born in Montville, Conn., graduated at Yale, 1862, became a physician at the College of Physicians and Surgeons in New York in 1866, and devoted himself especially to nervous diseases. During the Civil War he served as assistant surgeon in the United States navy and later investigated the relation of the brain and nerves and made special studies of clairvoyance, animal magnetism, mind reading, and spiritualism. He contributed to numerous medical journals and published many books and pamphlets. His chief works are *The Medical Use of Electricity* (1867), *Eating and Drinking* (1871), *Hay Fever* (1876), *Writer's Cramp* (1879), *Nervous Exhaustion*, *Neurasthenia* (1880), *American Nervousness* (1881), *The Psychology of the Salem Witchcraft Ecstasies of 1692* (1882), and *Seasickness: Its Nature and Treatment* (1884). He collaborated with Dr. A. D. Rock-

well on *The Case of Guiteau* (1882) and *The Medical and Surgical Use of Electricity* (1888).

BEARD, JAMES HENRY (1814-93) An American artist. He was born in Buffalo, N. Y., studied in various towns in which he happened to reside, and settled in Cincinnati as a portrait painter. Among his sitters were Henry Clay, John Quincy Adams, General Harrison, President Taylor, and other public men. In 1846 he exhibited in New York his first composition, "The North Carolina Immigrants," which gave him a national reputation. Among later works are "The Land Speculator," "The Long Bill," "Out All Night," "Don Quixote and Sancho Panza," etc. In 1870 he removed to New York and in his later years devoted himself chiefly to animal painting.

BEARD, RICHARD (1799-1880) An American clergyman, born in Sumner Co., Tenn. He began to preach in 1820, graduated at Cumberland College (Princeton, Ky.) in 1832, was professor of languages there from 1832 to 1838 and at Sharon College (Miss.) from 1838 to 1843. From 1843 to 1854 he was president of Cumberland College and from the latter year professor of systematic theology at Cumberland University (Lebanon, Tenn.). He was the most distinguished theologian of the Cumberland Presbyterian denomination and published two works of importance: *Lectures on Theology* (3 vols, 1870) and *Why I Am a Cumberland Presbyterian* (1874).

BEARD, THOMAS FRANCIS (1842-1905) An American illustrator and lecturer, known as "Frank" Beard, born in Cincinnati, Ohio. He was a son of James Henry Beard and a brother of Daniel Carter Beard. He was educated in his native city and served in the Civil War in the Seventh Ohio Regiment. His illustrated accounts of battles in *Harper's Weekly* and the *Illustrated News* attracted wide attention. He was also a popular lecturer, in which field he became widely known through his "chalk talks." In 1881 he was made professor of aesthetics at the University of Syracuse, and in 1897 took charge of the illustrations on *Judge*, relinquishing this for a similar position on the *Ram's Horn*. He died in Chicago.

BEARD, WILLIAM HOLBROOK (1825-1900) An American artist, brother of James H. Beard, known chiefly as an animal painter. He was born at Painesville, Ohio, and first became known for his portrait work. After several years of travel and study in Europe he settled in Buffalo. In 1861 he removed to New York, where he was made a member of the National Academy in 1862. He became very popular through his humorous and grotesque portrayal of rabbits, bears, monkeys, etc., which he endowed with human attributes, and in them burlesqued human foibles. Among them are "Bears on a Bender," "Dance of Silenus," "Flaw in the Title," "Darwin Expounding his Theories," and "Bulls and Bears in Wall Street."

BEARD MOSS. See USNA.

BEARDSLEE, BÉRDZ'LÉ, LESTER ANTHONY (1836-1903) An American naval officer, born at Little Falls, N. Y. He graduated at the United States Naval Academy in 1856, was executive officer of the *Wachusett* in 1864 when that vessel captured the Confederate privateer *Florida*, at Bahia, Brazil; and in 1870 carried the first American flag through the Suez Canal. He was made a rear admiral in 1895. From 1894 to 1897 he was commander of the United States

forces on the Pacific Station. He discovered, surveyed, and named Glacier Bay, Alaska.

BEARDSLEY, *berdz'li*, AUBREY VINCENT (1872-98). An English illustrator, one of the most original and influential of the nineteenth century. He was born Aug. 8, 1872, at Brighton and was educated in a private school there. A marvel of artistic precocity, he drew at 4, at 11 was able to sell his copied compositions, and at 15 produced a sketchbook of admirable original drawings, illustrating his favorite books, particularly the French classics. He had no instruction in drawing, but studied independently the prints and drawings in the British Museum of the old masters, particularly Mantegna, Durer, Botticelli, and Michelangelo. Another formative influence upon his art was the music of Wagner, for Beardsley possessed extraordinary musical talent, and as a boy was quite a piano virtuoso. At the conclusion of his school years he was placed in an architect's office, but was forced by ill health to relinquish this employment and accept a clerical position. From this he was released by the advice and protection of Burne Jones, who procured him admission to the Westminster Art School, but Beardsley attended only the classes in the nude for a few months. In 1892 he began the well-known designs for *Mort d'Arthur*, done in what may be called his pre-Raphaelite manner. This was followed by Japanese, Greek, and lastly by French Rococo influences, all of which were in turn thoroughly assimilated and subordinated to his own originality. An admirable appreciation of Beardsley's art, written by the etcher Pennell upon the appearance of Beardsley's illustrations in the *Studio* of 1893, hailed him as the coming illustrator and made his future assured. He was art editor of the *Yellow Book* (1894-95), to which he contributed many of his most daring illustrations. Other works which he illustrated about this time were the *Book of the Moon*, *Mot Libray*, the *Pall Mall Budget*, and Oscar Wilde's *Salome* (1894). The year 1896 has been characterized as his *annus mirabilis*, for it saw the acme of his achievement. He then designed the illustrations for the *Rape of the Lock*, *Lysistrata*, and, somewhat later, the remarkable frontispiece to *Volpone*, which is considered by many one of the world's greatest pen drawings. A victim of consumption, he spent the winter of 1896-97 at Bournemouth, where he embraced the Roman Catholic faith. In the latter year he revived sufficiently to visit his beloved France, and died at Monteno, March 16, 1898, without attaining his twenty-sixth year. Beardsley created a new and thoroughly original style of illustration, in which, with decorative talent of the highest rank, all forms, animate and inanimate, are conventionalized and adapted to his own manner. As a master of the flowing white line masses he is equalled only by the Japanese. One of the most effective features of his style is the use of dots to render delicate fabrics and surfaces. He brooded long over his designs, but seldom made preliminary studies, the remarkable sureness of his execution being due to his wonderful power of concentration. His imagination is unexcelled in the annals of illustration; but although his art is always refined in character, its content is often morbid and sensual. Collections of his drawings were published under the titles *A Book of Fifty Drawings by Aubrey Beardsley*, with text by Aymer Vallance (1897); *A Second Book of Fifty Drawings* (1899); *The Early Work of Aubrey*

Beardsley (1899); *The Late Work of Aubrey Beardsley* (1901). Under the *Hall*, with letters and poems of the author, was published in 1904. Of his biographies, the best are by Arthurs Symonds (1905) and Robert Ross (1908).

BEARDSLEY, EBEN EDWARDS (1808-91). An American clergyman. He was born at Stepney, Conn., and graduated with high honors at Trinity College, Hartford. He was associated for a number of years with St. Peter's Church, Cheshire, Conn., and with the Cheshire Episcopal Academy, and in 1848 was appointed rector of St. Thomas's Church, New Haven, which during his ministry became one of the first churches in the State. He spent much of his time in historical research and made valuable contributions to the ecclesiastical history of Connecticut. His writings include *The History of the Episcopal Church in Connecticut from the Settlement of the Colony to the Death of Bishop Doane* (1865) (1865), *Life and Correspondence of Samuel Johnson, D.D.* (1874), *Life and Times of William Samuel Johnson, LL.D.* (Boston, 1876), *Life and Correspondence of the Rt. Rev. Samuel Seabury, D.D.* (1881).

BEARDSLEY, JAMES WALLACE (1860-). An American engineer, born at Coventry, N. Y. He graduated from the New York State Normal School at Cortland in 1884 and afterward studied engineering at Cornell University, receiving the degree of C. E. in 1891. After supervising construction for several years in the Chicago Sanitary District, he joined the United States Board of Engineers on Deep Waterways (1898) and was placed in charge, first, of the surveys of the St. Lawrence River and, later, of harbor work. Removing to the Philippine Islands in 1902, he there became successively consulting engineer to the Philippine Commission, chief of the Bureau of Engineering, and director of Public Works. He spent the years 1908-09 as a consulting engineer, investigating the irrigation of Java, India, and Egypt, and in 1910 he became chief engineer of the Porto Rico Irrigation Service.

BEARDSLEY, SAMUEL (1790-1860). An American jurist, born in Hoosic, N. Y. He filled several minor State positions, and was United States District Attorney from 1823 to 1830. Afterward he was a member of Congress (1831-36, and 1843-45), Attorney-General of the State (1837-38), became a judge of the State Supreme Court in 1844, and succeeded Judge Bronson as its Chief Justice in 1847.

BEARDSTOWN. A city in Cass Co., Ill., about 45 miles northwest of Springfield, on the Illinois River, and on the Chicago, Burlington, and Quincy, and the Baltimore and Ohio Southwestern railroads (Map Illinois, B 3). The Beardstown division of the Burlington Route has its machine, car, and repair shops here, and there are extensive cooperages and manufactures of flour, lumber, cement posts, button blanks, etc. Ice packing and the fishing industry also are of considerable importance. Among the features of interest are a fine park, a great railroad bridge, a steel wagon bridge, a Carnegie library, and the city hall in which Lincoln conducted the Armstrong trial. Settled in 1832, Beardstown was incorporated as a city under a general law of 1896. Its charter of that date provides for a mayor, elected biennially, and a city council. The water works are owned and operated by the municipality. Pop., 1890, 4226; 1900, 4827; 1910, 6107.

BEAR-FLAG WAR See CALIFORNIA, History, and FREMONT, J C

BEARING In navigation and surveying, the direction of an object with respect to the position of some other, or to the direction of an assumed point or line. As observed from a ship objects are said to bear *ahead*, *astern*, *abeam* when they are directly ahead, directly astern, or at right angles to the ship's keel line (i.e., 90 degrees from ahead or astern). An object which bears midway between ahead and abeam is said to *bear on the port* (or *starboard*) *bow* or *broad off the port* (or *starboard*) *bow*, if its bearing is midway between abeam and astern it bears *on the port* (or *starboard*) *quarter*, or *broad off the port* (or *starboard*) *quarter*. Intermediate bearings are expressed in points (32 in the whole circle, each $11\frac{1}{4}$ degrees) thus $11\frac{1}{4}$ degrees from astern is *one point on the port* (or *starboard*) *quarter*, the same amount from abeam is *one point forward* (or *abaft*) *the port* (or *starboard*) *beam*, similarly, $11\frac{1}{4}$ degrees from ahead is *one point on the port* (or *starboard*) *bow*. In like fashion the bearings may be one, two, or three points on bow, or quarter, or forward, or abaft, the beam. Four points from bow, stern, or beam is either *broad off the bow* or *broad off the quarter*. A ship is said to be *abeast* an object when it bears abeam, it is *aboard* another ship when the two are side by side and moving in the same direction. When an object lies across a certain direction it is said to be *athwart* it, as, a ship is lying *athwart the house* of another when she or her chain lies in a direction at right angles to that in which the other is swinging, any object extending across the ship lies *athwartship*. On board sailing vessels objects on the side from which the wind is blowing are said to be to *windward*, if forward of the beam (one or more points) on the *weather bow* or *foreward* of the *weather beam*, similarly when abaft the beam. If on the side of the ship away from the wind, the object is said to be *leeward*, *on the lee bow*, etc. Bearings taken without regard to the vessel, but with respect to absolute terrestrial direction, are either *compass*, *magnetic*, or *true*. For the ruling of 1913 as to the use of "port" and "starboard" in the United States navy, see HELM.

Bearing, Compass The angle between the compass needle and the direction of the object observed. See COMPASS.

Bearing, Magnetic The angle between the magnetic meridian and the direction of the object observed. See COMPASS.

Bearing, True The angle between the geographical meridian and the direction of the object observed. All bearings are measured in points ($11\frac{1}{4}$ degrees each) or degrees. The designation of true and magnetic bearings, either in points or degrees, is the same as for compass bearings, but the record of the bearing is followed by *p c* (i.e., per compass) for compass bearings and by *mag* (i.e., magnetic) for magnetic bearings, and by *true* for true bearings. See COMPASS.

In Machinery and Mill Work, the bearing is the name given to the surfaces of contact of stationary elements which support, guide, and restrain the moving elements which are transmitting motion and power. Such are met when revolving shafts are supported and kept in line, and at the two ends of a connecting rod of a steam engine. For reciprocating motion

the surfaces of the bearings must be made up of elements which are rectilinear in the line of the motion. Such bearings are usually called guides, and examples are found in the crosshead guides of a locomotive and also in most other forms of steam engines. For rotary motion the bearing surfaces must be surfaces of revolution, examples of such bearings are found in the hangers for mill shafting, in the pivots of turntables, trucks of railway cars, etc. The bearing surface of the support is often made of special metal to reduce friction. For similar purposes the rotating surface is often constructed so as to be supported and guided by steel balls traveling in a proper track or ball race or by cylindrical or conical rollers held by the support. The bearings of a bicycle are familiar examples of ball bearings, and both roller and ball bearings are used for motor-vehicle wheels. Some bearings are used in screw jacks, many machine tools, elevators, etc., in which the moving part is threaded like a screw and the support is threaded like a nut. Such bearings allow rotary motion and reciprocating motion at the same time resulting in a helical motion.

The *thrust bearings* of large steamship propeller shafts consist of a series of collars of rectangular section, which are receiving into depression in the bearing surface which they fit. The propulsive reaction is borne by the flat areas of the collars in the direction of the axis of the shaft. Such bearings are usually made with hollow spaces through which water for cooling can be circulated. These bearings differ from screw bearings in that the threads are not spiral, but run straight around the nut and shaft, and so only rotary motion is possible. In machinery *ball bearings* are often employed for many purposes and are capable of supporting great pressure or weight. *Roller bearings* are made which are capable of sustaining a weight of several hundred tons. Gun carriages and turrets rest upon roller or ball bearings. *Hydraulic or fluid bearings* are used where very heavy endwise thrusts are to be resisted, as in the vertical shafts of the massive turbines at Niagara Falls. An oil is pumped between the stationary bearing and a collar or disk which presses against the flat area of its end. Into the space between bearing and plate a thin film of oil is forced by a pump at a pressure just sufficient to overcome the endwise thrust of the shaft and keep the metallic surfaces from touching and rubbing. The excess of oil flows into a sump or cistern and is taken out to be used over again by the suction of the pressure pump. Great care must be taken to keep the bearings of a shaft in line, otherwise the shaft is flexed in each revolution and the power to bend it is wasted and the waste must be made up by the source of the power. In cylindrical bearings, as for revolving shafts of all kinds, the stationary part is the *bearing* and the revolving surface in contact with it is called the *journal*.

BEAR LAKE, GREAT See GREAT BEAR LAKE.

BEAR MOUNTAIN A hill of the Stony Mountain Range in Dauphin Co., Pa., north of Harrisburg, containing beds of anthracite. Its elevation is about 760 feet.

BÉARN, bə'arn' (*Benearnium*) of the Middle Ages, from the Gallic *Benarnus*. An ancient province of France, now forming the greater part of the department of the Basses-Pyrénées, Béarn was a portion of Aquitania under the

Romans and after the downfall of the Roman Empire passed under the domination of the Franks. After the tenth century the country attained great importance under a line of independent counts of the houses of Foix and Navarre. Its cities enjoyed extensive municipal rights from a very early time. Jeanne d'Albret, Queen of Navarre and Béarn, was the mother of Henri II, who ascended the French throne as Henri IV. By his enemies he was derisively called the Béarnois. When he became King, Béarn virtually became a part of France, but was formally incorporated with it only in 1620 by Louis XIII. Consult Bordenave, *Histoire de Béarn et Navarre* (Paris, 1873).

BEAR RIVER. A river which rises in north Utah in the Uintah Mountains, and flows nearly north. It enters Wyoming, reenters Utah, again crosses into Wyoming, and, taking a northwest course, enters Idaho, but at Soda Spring, Bannock County, it turns to the south, and reentering Utah, empties into Great Salt Lake (Map Utah, C 1). It is about 400 miles long, though the distance from its source to its mouth is only 90 miles. It is noted for the many soda, magnesia, and other mineral springs to be found on its banks.

BEAR STATE. Popular name for Arkansas. See STATES, POPULAR NAMES OF.

BEAS, be'as (anciently, *Hyphasis*). One of the five rivers of India, which give name to the *Punjab*, or "land of five waters." It rises on the verge of the Rohtung Pass of the Himalayas, in lat 32° 34' N and long 77° 12' E, its source being 13,200 feet above the sea level. After a course of about 300 miles it joins the Sutlej, 35 miles to the south southeast of Amritsar.

BEAT. The motion of the hand and arm, or baton, by which the conductor of a chorus or orchestra indicates the time and rhythm of a musical composition, and insures perfect unanimity of performance on the part of the singers or players. In ancient times the leader used his foot to mark the time, and this person, called by the Greeks *coryphaeus*, and by the Romans *pedicularius*, wore sandals of wood or metal to make his beat more emphatic. Leaders who marked the time by clapping their hands were called *manu ductores*. The etiquette of modern musical performance demands that the conductor shall perform his task as inaudibly and inconspicuously as possible, but this refinement is of recent date, for Rousseau, in 1768, writing of the Paris Opera, declares that the listener is "shocked by the continual and disagreeable noise made by him who beats the measure."

With the Greeks the up beat, indicated by the raising of the foot or the hand (called *arsis*, 'lifting'), denoted the unaccented part of the foot or measure, the down beat indicated by putting down the foot, in marching, dancing, or beating time (called *thesis*, 'putting down') denoted the accented part of the measure. The Roman grammarians wrongly fancied that the terms *arsis* and *thesis* referred to the raising and lowering of the verse, and so interchanged them, making *arsis* denote the accented, *thesis* the unaccented, part of the measure. Modern writers on Greek and Latin meters use the terms now in the Greek sense, now the Roman. In modern times the first note or count of the measure, which has always the strongest accent, is marked by a downward motion of the hand or baton. In double time, with two beats to the measure, this down beat is followed by an up-

ward beat on the unaccented count. In triple time, with one strong and two weak beats, the first beat is down, the second to the right, and the third upward. In quadruple time, with four beats, the usual order is down, to the left, to the right, and up. See CONDUCTOR.

BEATIFICATION (Lat *beatus*, blessed + *facere*, to make). A solemn act in the Catholic church, by which the Pope, after scrutinizing the life and services of a deceased person, pronounces him blessed. After this he may be venerated in a specified portion of the church, and the act holds out the prospect of future canonization, which entitles him to general veneration (not worship) in the Church Universal. Beatification was introduced in the twelfth century. It may be regarded as an inferior degree of canonization (q.v.).

BEATIFIC VISION (Lat *beatificus*, from *beatus*, happy + *facere*, to make, Lat *visio*, from *videre*, to see). The direct vision of God, constituting the bliss of angels and of men in heaven. A term of Roman Catholic theology. The Council of Florence (1439 A.D.) defined "The souls of those who, after receiving baptism, have incurred such stain of sin whatever, or who, after incurring such stain, have been purified in the body or out of the body, are at once received into heaven and clearly see God himself as He is, in Three Persons and One Substance, some, however, more perfectly than others, according to the diversity of their merits." Such vision is supposed to have been enjoyed by Moses (Ex xxxiii 11) and by Paul (2 Cor xii 4) before their death, but it is not ordinarily given in the flesh. Hence the loose application of the term to such visions as those of St. Catharine is improper. It is not taught that the saints have a perfect knowledge of God, for this is impossible to finite creatures. But they have such knowledge of Him as He wills, and see in Him all the facts concerning His creation which He wills to communicate. Thus, it is said, they can hear prayers addressed to them, though not omniscient, because enabled by the beatific vision. Consult *The Catholic Encyclopedia*, art. Heaven (New York, 1910).

BEATING THE BOUNDS. The popular expression in England for the periodical surveys or perambulations by which the ancient boundaries of parishes are preserved. Formerly the ceremony took place annually, but now it is observed less often. The procedure, according to common custom, is in this wise: On Holy Thursday or Ascension Day the clergyman of the parish, the parochial officers and other parishioners, together with the boys of the parish school, headed by their master, go in procession to the parish boundary. It is their duty to trace very carefully every foot of the boundary, even if ladders must be used in climbing over buildings and other obstructions. It is desirable to have as many boys as possible. At each "boundary mark" a halt is made, and the boys beat the mark with peeled willow wands to impress its location on their memories. The beating was not confined to the above performance of the boys, but where it was desired to preserve evidence of particular boundaries, the singular expedient was used of whipping the boys themselves on the spot, or one of them, who received a stated fee for the permitted castigation out of the parish funds—it being thought that the impression made on the memory was thus more likely to be lasting.

The custom is a Teutonic institution, taking its rise in the "procession" of the ancient mark or township. This procession was led by the priest, who performed sacrifices on altars placed near the borders. When the Germans were converted, the Christian priest took the place of the pagan, and the heathen sacrifice was supplanted by the mass. The procession is still maintained in Bavaria, as also in Russia. Similar duties were performed by the appointed "perambulators" in the New England Colonies and by the processions in early Virginia. In English law the correct legal term for beating the bounds is perambulation (q.v.). Consult Toulmin Smith, *The Parish* (London, 1857), Brand, *Popular Antiquities* (London, 1873-77), Lysons, *Encycrons of London*, vol. 11 (London, 1792-96), Hone, *Every Day Book* (London, 1826-31), Steer, *Parish Law* (London, 1887), Grimm, *Rechtsaltertumer* (Göttingen, 1854), Laveleye, *Primitive Property* (Eng. trans. London, 1878), Wallace, *Russia* (New York, 1881), and, in general, Howard, *Local Constitutional History*, vol. 1 (Baltimore, 1889).

BEATITUDES (Lat. *beatitudo*, blessing) The name frequently given to the opening clauses, nine in number, of the Sermon on the Mount, each of which begins with the word "Blessed." See Matt v 3-11.

BEATON, bē'ton, Scot. *pron* bā'ton, or BETHUNE, DAVID (1494-1546) A Cardinal and Primate of Scotland, noted for his opposition to the Reformation in that country and for his persecution of Protestants. He was born in Fife and became a student at St Andrews University, afterward studying canon and civil law in Paris. After filling several minor positions with ability, he was appointed Lord Privy Seal in 1528, and in 1533 went as Ambassador to France. On the recommendation of the French King, Pope Paul III in 1538 made Beaton Cardinal, and in 1539, at his uncle's death, he became Archbishop of St Andrews. On the death of James V, Dec 14, 1542, after the disastrous overthrow of the Scots at Solway Moss, Beaton produced an alleged will of the late King, appointing himself, with three others, regent of the kingdom during the minority of the infant Queen, Mary. The nobility, however, rejected the document and elected the Earl of Arrian regent, who then professed the Reformed faith. The following month Beaton was arrested and imprisoned, accused, among other charges, of a design to introduce French troops into Scotland, in order to stop the negotiations then in progress with Henry of England for a marriage between the young Prince of Wales, afterward Edward VI, and the infant Queen of Scots. He was soon after liberated and reconciled to the regent, whom he induced to abandon the English interest and publicly to abjure the Reformed religion. On the young Queen's coronation in 1543, Beaton was again admitted to the council and appointed Chancellor. Much has been written of his cruel persecution of the Protestants, but it must be discounted as the statement of his political as well as religious enemies. Persecution was undoubtedly carried on, but except in the cases of prominent people where political motives were added to those of religion, it can hardly be attributed to the Cardinal but rather to the whole spirit of the time. In February, 1546, he caused the celebrated evangelical preacher, George Wishart, to be arrested, tried for heresy, and, upon his condemna-

tion, to be burned at the stake. Even this, however, was prompted by the discovery of a plot against the Cardinal's life in which he had reason to believe Wishart was concerned. The lairds of Fife, friends of Wishart, determined to avenge him and secure their own safety by compassing the Cardinal's death. John Leslie, brother to the Earl of Rothes, his nephew Norman, and Kirkaldy of Grange, entered the archiepiscopal palace by stealth and, surprising the Cardinal in his bedroom, murdered him on May 29, 1546. Although a talented man, Beaton was arrogant, cruel, and immoral. He had six natural children. He married the three daughters into titled families, and one of his sons became a Protestant. Consult Chambers, *Biographical Dictionary of Eminent Scotsmen* (London, 1875), and Burton, *History of Scotland* (Edinburgh, n.d., Index).

BEATRICE, bē'a-tris A city, and the county-seat of Gage Co, Neb., 40 miles south of Lincoln, on the Union Pacific, the Chicago, Rock Island, and Pacific, and the Burlington railroads, and on the Big Blue (Map Nebraska, H 4). It contains a public library, a State Institute for the feeble-minded, a courthouse, and Federal buildings. The city has excellent water power and is engaged in the manufacture of flour, gasoline engines, agricultural implements, etc. The surrounding region is rich agricultural country, producing wheat, corn, oats, and alfalfa, and there are valuable stone quarries in the vicinity. Settled in 1859, Beatrice was incorporated as a town in 1871 and became a city two years later. The commission form of government has been adopted, and the city owns the water works and electric street-lighting plant. Pop, 1900, 7875, 1914, 9356.

BEATRICE 1 A brilliant and witty character in Shakespeare's *Much Ado About Nothing*. She finally marries her male counterpart, Benedick, in spite of herself. 2 See **BEATRICE PORTINARI**.

BEATRICE CENCI, bā'a-trē'chā chēn'ché See **CENCI**, **BEATRICE**.

BEATRICE PORTINARI, pōr'tē-na-rē (1266-90) The daughter of a Florentine noble, Folco Portinari, and wife of Simone dei Bardi, identified by Boccaccio with the Beatrice of Dante's poems. Dante first saw her when she was but nine years old, and but seldom afterward, yet his passion for her forms the theme of his *Vita Nuova*, and after her untimely death his love assumed a more and more mystic form, and he made her the central symbol of his *Divina Commedia*, the personification of Revelation. The identity of Beatrice and her allegorical significance in the *Divina Commedia* have been made the subject of an extensive literature, of which the best summary is given by Moore, *Studies in Dante*, 1st ser, pp 79-151 (Oxford, 1899).

BEATRIX, bē'a-triks 1 A character in Dryden's comedy, *An Evening's Love, or, The Mock Astrologer*. 2 **BEATRIX ESMOND**, a cousin to Henry Esmond in Thackeray's novel of that name, a beautiful, vain, ambitious woman, who also appears in the sequel, *The Virginians*, as Madame de Bernstein. Henry Esmond was in love with her and for her sake engages in the plot to bring back the Stuarts on the death of Queen Anne.

BEATRIX (bē'a-triks), **ANTELOPE**. An Arabian gemsbok (*Oryx beatrix*) resembling

the beisa (qv), but without black markings on the hind quarters See ORYX

BEATTIE, bā'tē, JAMES (1735-1803) A Scottish poet and moral philosopher. He was born Oct. 25, 1735, at Laurencekirk. He studied at Marischal College, Aberdeen, where he acquired a high reputation as a classical scholar. In 1760 he became professor of moral philosophy in Marischal College. Ten years afterward appeared Beattie's famous *Essay on Truth*, an attempt to refute the skepticism of Hume. The book, which now reads like an invective against Hume, at once made Beattie conspicuous as a defender of orthodoxy. He was introduced to George III, received a pension of £200, and had the offer of a living in the Anglican church and the chair of moral philosophy at Edinburgh. Though his head was slightly turned by this success, he declined all these offers. The essay is of little importance in the history of philosophy and has consequently been long neglected. In 1771 appeared the first part of *The Minstrel*, written in the Spenserian stanza, and in 1774 the second part. It is a delightful poem filled with true poetical emotion and rich in picturesque descriptions, while the versification has a quiet melody of its own. The poem describes "the progress of a poetical genius born in a rude age, from the first dawning of fancy and reason till that period at which he may be supposed capable of appearing in the world as a minstrel." Beattie intended to add a third part, but circumstances prevented his doing so. In 1776 he published a series of essays on poetry, music, etc., in 1783, *Dissertations Moral and Critical*, in 1786, *The Evidence of the Christian Religion Briefly and Plainly Stated*, and in 1790-93, *The Elements of Moral Science*—all of which works are written in a clear and graceful style and with a high appreciation of whatever is beautiful and good. He died Aug. 18, 1803. Consult Forbes, *Life and Writings of James Beattie* (Edinburgh, 1824).

BEAU BRUMMELL See BRUMMELL, GEORGE B.

BEAUCAIRE, bō'kar' (anciently, Lat *Ugernum*, later *Bellum Quadrum*, beautiful square). A well-built commercial town of France, on the right bank of the Rhône, in the department of Gard, opposite Tarascon, with which it is connected by a suspension bridge. The harbor is commodious for vessels, which enter it by a canal communicating with the Mediterranean and thus avoid the sand banks at the mouth of the Rhône. Beaucaire is well known for a great fair, established, it is said, as early as the twelfth century. It is held annually about the middle of July and lasts six days. In former times, when this fair was free from duties, it was attended by merchants and manufacturers from almost all parts of Europe, the Levant, and even Persia and Armenia, but the numerous imposts demanded since 1632, foreign wars, and the competition of Marseilles, Lyons, and other large places reduced the traffic of Beaucaire, which sank still lower in the days of the Revolution. The chief articles of present-day commerce are silks, wines, fruits, and stone from near-by quarries. Pop., 1901, 7859, 1900, 8764; 1911, 8453.

BEAUCHAMP, bō'shā, ALPHONSE DE (1767-1832). A French historian and publicist. He was born at Monaco, received his education in Paris, and entered the Sardinian military service. In 1792 he suffered imprisonment for re-

fusing to bear arms against his country, but escaped to France, and under the Directory obtained a situation in the office of the Minister of Police, and had the surveillance of the press. Here he commenced his *Histoire de la Vendée et des Chouans* (3 vols., Paris, 1806), which depicted the cruelties of the Fouché regime. As this work displeased the Emperor, Beauchamp was banished to Rheims, but he was recalled in 1811 and again received a subordinate appointment. Under the Restoration he received a pension and wrote for the *Moniteur* and the *Gazette de France*. Among his works are the *Histoire du Brésil* (Paris, 1815), *Histoire du Pérou* (Paris, 1807), *Vie de Jules César* (Paris, 1821), *Vie de Louis XVIII* (Paris, 1821), *Les Mémoires de Fouché* (Paris, 1823-29). He also been ascribed to him.

BEAUCHAMP, RICHARD DE See WARWICK, RICHARD DE.

BEAUCHAMP, bēch'am, WILLIAM MARTIN (1830-) An American ethnologist and clergyman, born in Coldenham, Orange Co., N. Y. He graduated at the DeLaney Divinity School and from 1865 to 1900 was rector of Grace Episcopal Church in Baldwinsville, N. Y. From 1884 to 1912 he was examining chaplain for the diocese of central New York. He made much valuable archaeological research, particularly concerning the Iroquois Indians. He was detailed in 1889 by the United States Bureau of Ethnology to survey the Iroquois territory in New York and Canada and prepared a map indicating the location of all the known Indian sites in that region. An enlargement of this map was published in his *Aboriginal Occupation of New York* (1900). His other works are *The Iroquois Trail* (1892), *Indian Names in New York* (1893), *Shells of Onondaga County* (1896), *History of the New York Iroquois, now Commonly Called the Six Nations* (1905), *Aboriginal Use of Wood in New York* (1905), *Aboriginal Place Names of New York* (1907), *Past and Present of Syracuse and Onondaga County* (1908).

BEAUCLERK, bō'klark, TOPHAM (1739-80). A gentleman who figures in Boswell's *Johnson* as the intimate and friend of the lexicographer. He was the only son of Lord Sydney Beauclerk. During his friend's last illness Johnson said he would "walk to the extent of the diameter of the earth to save Beauclerk," and after his death wrote to Boswell "Poor dear Beauclerk. . . His wit and his folly, his acuteness and maliciousness, his merriment and reasoning, are now over. Such another will not often be found among mankind." In 1768 Beauclerk married Diana, daughter of the second Duke of Marlborough, two days after her divorce from Lord Bolingbroke. Consult G. Birkbeck Hill, *Dr. Johnson, His Friends and his Critics* (1878).

BEAUFORT, bō'fört. A town, seaport, and the county-seat of Carteret Co., N. C., at the mouth of Newport River, 145 miles (direct) southeast of Raleigh, on the Norfolk Southern Railroad (Map. North Carolina, F. 3). It is a popular summer resort and has a good harbor, the entrance to which is protected by Fort Macon. Its principal industries are fishing and the manufacture of oil and scrap. The electric light plant is owned by the town. Pop., 1890, 2007, 1900, 2195, 1910, 2483.

BEAUFORT, bō'fört. A town, and the county-seat of Beaufort Co., S. C., on an inlet known as the Beaufort River, which connects with Port Royal Sound, one of the finest har-

bors in the State (Map South Carolina, D 4). Beaufort is 80 miles by rail southwest of Charleston, on the Charleston and Western Carolina Railroad. It is famous for the production of long-staple, or sea-island, cotton, is a centre of phosphate and fertilizer trade, and has also large exports of lumber. Truck farming is carried on extensively. The town has a national cemetery and the "Old Fort." It owns the water works and electric light plant. Beaufort was first incorporated in 1803 and is governed under a charter of 1913 by an "intendant," elected biennially, and a council. Pop., 1910, 2986.

Beaufort was founded in 1711 and, next to Charleston, was the earliest settlement in the State. Near the town in 1664 French Huguenots under Captain Ribault built a fort, which was abandoned in 1665. Shortly after, Menendez established a post on the site. In 1686 Lord Cairdross attempted to found a town here, but his settlement was immediately broken up by Spaniards from St. Augustine. The place was very prominent in the Colonial history of the State and for some years before the Civil War was a popular health resort for Southern planters. Near Beaufort, on Feb. 9, 1779, an American force under General Moultrie defeated a detachment of English troops under Prevost. Consult Parkman, *Pioneers of France in the New World* (Boston, 1865), and references in McCready, *History of South Carolina*.

BEAUFORT, bô'fôr', FRANÇOIS DE VENDÔME, DUC DE (1618-69). A French naval officer, the grandson of Henry IV. He was a conspirator with Cinq-Mars against Richelieu and fled for safety to England. Under Louis XIV he was in a conspiracy against Mazarin and was imprisoned. He escaped in 1648, became a leader of the Frondeurs, and was the idol of the Parisian populace, who called him 'King of the Markets' (*Roi des Halles*) on account of the coarseness of his language. He killed the Duke of Nemours, his brother-in-law, in a duel, afterward made his peace with the court and was appointed to command the navy. In 1664 and 1665 he defeated the African corsairs and in 1666 led the fleet which was to aid the Dutch against England. He was killed in 1669 while assisting the Venetians, who were besieged by the Turks in Candia.

BEAUFORT, bô'fôrt or bô'fêrt, HENRY (c. 1377-1447). An English Cardinal. He was a natural son of John of Gaunt, Duke of Lancaster, but he and his brother were later legitimized. He was educated and spent most of his youth at Aix-la-Chapelle. After holding various offices in England, he became Bishop of Lincoln in 1398 and chancellor of the University of Oxford in 1399. After his half brother, Henry IV, became King, Beaufort was made Chancellor of England in 1403. But he resigned this office when he removed to Winchester, of which he was made Bishop in 1404. For the next 40 years he was prominent in every political movement in England. He was twice again Chancellor, and as such depended for his strength upon the support of Parliament. He amassed enormous wealth and lent it freely to the King when the royal treasury was empty. On two occasions his loans to the state are said to have amounted to over £20,000, an extremely large sum for any individual at that time. He was present at the Council of Constance and voted for the election of Pope Martin V, by whom he was subsequently made a Cardinal and sent as

legate to Germany, Hungary, and Bohemia to organize a crusade against the Hussites. This undertaking failed. The Cardinal soon after fell under the displeasure of the Pope, because he used in France an English army raised for the Crusades. In 1431 Beaufort conducted the young King, Henry VI, to France and crowned him in Paris as King of France and England. Here he also endeavored, but vainly, to reconcile the Duke of Bedford, Regent of France, with the offended Duke of Burgundy. Cardinal Beaufort died at Winchester, April 11, 1447. Consult Stubbs, *Constitutional History of England*, vol. III (Oxford, 1895), and Radford, *Henry Beaufort* (London, 1908).

BEAUFORT, bô'fôrt or bô'fêrt, MARGARET, Countess of Richmond and Derby (1441-1509). She was the daughter of the first Duke of Somerset and became the wife of the Earl of Richmond (half-brother of Henry VI) and by him mother of Henry VII of England. Left a widow, she was successively wife of Sir Henry Stafford and of Thomas, Lord Stanley, afterward the Earl of Derby. She endowed Christ's and St. John's colleges at Cambridge. Consult Halsted, *Life of Margaret, Countess of Richmond* (1839), and Cooper's *Memoir*, edited by Mayor (1874).

BEAUFORT SCALE. An arbitrary scale of 12 numbers, for use in recording the apparent strength of the wind, introduced into the British navy by Admiral Beaufort about 1805 and now very generally used by all navigators. Originally the observer was supposed to know the general effect of the wind upon his own vessel or the standard vessel imagined by Admiral Beaufort—viz., the full-rigged man-of-war—but these vessels are not now built, although the wind terms retain their old significance, therefore the latter are retained, but the numbers expressing the equivalent velocities in miles per hour, as they result from modern investigations, are added in the following table.

Beaufort Scale No.	Designation of Wind	Approximate Wind Velocity in Miles Per Hour
0	Calm	3 or less
1	Light air	8 "
2	Light breeze	13 "
3	Gentle "	18 "
4	Moderate "	23 "
5	Fresh "	28 "
6	Strong "	34 "
7	Moderate gale	40 "
8	Fresh "	48 "
9	Strong "	56 "
10	Whole "	65 "
11	Storm "	75 "
12	Hurricane	90 "

BEAUGENCY, bô'zhan'sê'. A town in the department of Loiret, France, on the Loire, about 16 miles southwest of Orleans (Map France, N, G 5). It was formerly fortified and has been frequently besieged. The principal features are a Romanesque church of Notre Dame dating from the eleventh century, the remains of an abbey of the seventeenth and eighteenth centuries, and a statue of Joan of Arc, which was erected here in 1896 to commemorate her victory over the English in 1429. Pop., 1901, 3565, 1911, 3532.

BEAUHARNAIS, bô'âr'nâ', 'ALEXANDRE, VICOMTE DE (1760-94). 'A French statesman and soldier. He was born in the island of Martinique and served under Rochambeau in the American War of Independence. He embraced

the cause of the Revolution, was a member of the Constitutional Assembly, and on the night of the 4th of August, 1789, voted for the abolition of feudal privileges. He served with distinction on the committee for military affairs, and presided over the National Assembly when the news came of the flight of Louis XVI. "Gentlemen," he said, "the King has run away. We will proceed with the order of the day." He fought bravely in the north, especially at Mons, but resigned his command in 1793, in accordance with the law which excluded the nobility from the army. After he had lived for some time in retirement his enemies brought forth the charge that, as commander of the Army of the Rhine, he had been the cause of the loss of Mainz. He was put on trial during the Reign of Terror, convicted, and guillotined, July 23, 1794. His widow, Joséphine, married Napoleon Bonaparte, who adopted Eugène and Hortense, son and daughter of Beauharnais.

BEAUHARNAIS, EUGÈNE DE (1781-1824) A French general. He was the son of the Vicomte de Beauharnais, and after his mother's marriage with Bonaparte he accompanied him in the expedition to Egypt and in his campaigns in Italy. He rapidly rose to the highest military rank, and in 1805, after the erection of the Imperial throne, he was made a Prince of France and Viceroy of Italy. In 1806 he married the Princess Amelia Augusta of Bavaria and not long afterward was created Prince of Venice and declared by Napoleon his adoptive son and heir to the Kingdom of Italy. Although his political power was much limited, he conducted himself in Italy with much prudence, energy, and moderation, although he considered himself bound to carry out the decrees of the Emperor. His military talents were displayed in the wars against Austria, and in the retreat from Moscow the preservation of the French army from total destruction was ascribed to the skill and resolution of the Viceroy and of Ney. The victory of Lützen (1813) was decided by his conduct. From this scene of war Napoleon sent him to Italy, which he ably defended against Austria and Murat, who had deserted the cause of the French Empire. In the affairs of the Hundred Days he took no part, and in the Treaty of Fontainebleau and at the Congress of Vienna large sums were granted to him in compensation for his Italian possessions, with which he purchased from his father-in-law the Landgraviate of Leuchtenberg and the Principality of Eichstätt. His eldest son, Charles Auguste Eugène Napoleon, Duke of Leuchtenberg, married Queen Maria of Portugal on Jan. 25, 1835, but died on the 18th of March of the same year. Another son, Max Eugène Joseph Napoléon (died 1852), who succeeded his brother as Duke of Leuchtenberg, married the Grand Duchess Maria of Russia. Consult *Mémoires du Prince Eugène de Beauharnais* (Paris, 1858-60).

BEAUHARNAIS, HORTENSE EUGÉNIE See BONAPARTE

BEAUHARNOIS. The chief town of Beauharnois Co. in the province of Quebec, Canada, situated on Lake St. Louis (formed by the St. Lawrence River), 21 miles southwest of Montreal (Map Quebec, E 5). It has several mills and factories. Pop., 1911, 2015.

BEAULIEU, bô'lyé', JEAN PIERRE (1725-1819). An Austrian general, born at Namur. He entered the army in 1743, served in the Seven Years' War, being present at Breslau and Leu-

then, and in 1780 took an active part in the suppression of the Belgian insurrection. As major-general he increased his military reputation by his services in the campaigns against the French in Belgium. In 1796 he was appointed commander of the forces in Italy, but after the defeat by Bonaparte at Lodi he relinquished the command to Wurmser.

BEAUMANOIR, bô'mân'war', PHILIPPE DE RÉMI, SIRE DE (c.1250-96). A French jurist and poet. From 1279-82 he was *bailli* at Clermont, and from 1293 to his death at Senlis. His chief work, *Les Coutumes de Beauvoisis*, is highly commended by Montesquieu. It is the masterpiece of mediæval judicial literature, the main source of knowledge, not only of old French law, but of the society of the thirteenth century. The best edition is that of A. A. Beugnot (1842). Among his poems, the "Manekine," "Jehan et Blonde," and a "Salut d'amour" are the most noteworthy. Consult August Morel, *Etude historique sur les coutumes de Beauvoisis* (Paris, 1851).

BEAUMARCHAIS, bô'mar'shâ' A name assumed by Pierre Augustin Caron (1732-99), the most important French dramatist of the eighteenth century, though he wrote but two really successful plays, *Le barbier de Séville* (1775) and *Le mariage de Figaro* (1784). He was born in Paris, the son of a watchmaker, and was educated to his father's trade. He early developed a marked taste for music and sufficient proficiency to become music master to the daughters of Louis XV. He turned this position to good account in speculations. In 1764 he made a journey to Spain to protect or vindicate his sister, who had been abandoned by her betrothed, Clavijo. His account of this mission in his *Mémoires* suggested the drama *Clavijo* to Goethe. He brought from Madrid a knowledge of things Spanish that was later of much use to him. He now turned to the drama, wrote *Eugénie* (1767), a fairly successful domestic drama, and *Les deux amis*, a decided failure in the pathetic vein. Meantime he had become engaged in financial speculations that led to lawsuits, and these to a series of *Mémoires*, appeals to the public that are among the most vigorous, audacious, clever, and witty polemics in literature. Their attack on judicial injustice gave them a universal interest. They were eagerly read and deepened the discontent with the existing state of society that was to culminate in the Revolution. Beaumarchais thus became a political personality. He was confidentially employed by Louis XV and later by Louis XVI, but before this he had snatched a sensational dramatic triumph out of failure by rearranging a comic opera into a five-act comedy—his *Barbier de Séville* (1775), Spanish in scene, but essentially French at the heart, the most famous comedy of the century, save only its sequel from the same hand. It is simple, lively, ingenious, effective, and it contains one of the strongest-drawn characters of dramatic literature—Figaro, an incarnation of the new democracy.

Beaumarchais now engaged in furnishing the American revolted Colonists with supplies and acquired a pecuniary claim against the United States that remained long unsettled. His restless spirit also projected a complete edition of Voltaire, and he prepared a sequel to the *Barbier*, *Le mariage de Figaro*, so daringly democratic and revolutionary that it received the advertisement of a legal prohibition. This so

whetted public curiosity that when at last it was licensed, three persons were crushed to death in seeking entrance to the National Theatre (Théâtre Français, 1784). Here the wit is keener, the action swifter, the social satire more mordant than in the *Barbier*. Figaro, the light-hearted, versatile, shrewd scapegrace, was furnishing a social solvent that would disintegrate society and invite the Revolution. Beaumarchais had probably no more serious purpose than delight in his own wit. "He wished to fire a squib and he exploded a magazine." These comedies mark, in dialogue, construction, and intrigue, the high-water mark of the century. If they err, it is in the monotony of their brilliancy. The tradition of their unparalleled success gave models to Hugo and Dumas and inspired the operas of Rossini and Mozart. Beaumarchais did nothing more of significance. An opera libretto, *Tarare* (1777), is a trifle. A heavy melodrama, *La mère coupable* (1790), vainly seeks to recall Figaro. Soon Beaumarchais fled from the Terror to Holland. He returned in 1796 and left at death a comfortable fortune that he had managed to save from the wreck of the Revolution. Beaumarchais' works are edited by Gudin (7 vols., 1809), by Furne (6 vols., 1827), and by Moland (1874). Consult also Loménie, *Beaumarchais et son temps* (4th ed., trans. by Edwards, London, 1856), Lintilhac, *Beaumarchais et ses œuvres* (Paris, 1887), Gudin de la Brenellerie, *Histoire de Beaumarchais* (ed. Tourniaux, Paris, 1886), Lescure, *Éloge de Beaumarchais* (Paris, 1887), Bonnefou, *Étude sur Beaumarchais* (Paris, 1887), Hallays, *Beaumarchais* (Paris, 1897).

BEAUMARIS, bô-mâr'is (Fr. *beau marais*, beautiful marsh). A seaport, and the chief town of the island of Anglesey, North Wales, on the west side of the picturesque bay of Beaumaris, near the north entrance to the Menai Strait, 3 miles north of Bangor and 239 miles northwest of London (Map Wales, B 3). It is a modest little watering place, with excellent sea bathing. It has picturesque covered runs of an ancient castle, one of the three (Conway and Carnarvon being the other two) castles in Wales built by Henry de Ebreton, the famous architect of Edward I. Pop., 1891, 2200, 1901, 2326, 1911, 2231. Beaumaris is in steamship communication with Liverpool.

BEAUMONT, bô-mônt'. A city, and the county-seat of Jefferson Co., Tex., 84 miles by rail east by north of Houston, on the Neches River, the Sabine-Neches Canal, and on the Gulf, Colorado, and Santa Fe, the Gulf and Interstate, the Texas and New Orleans, the Kansas City Southern, and the Beaumont, Sour Lake, and Western railroads (Map Texas, E 4). The accessibility of vast forests has contributed materially to the city's development as one of the greatest lumber centres of the South, the transportation facilities afforded by the railroads being augmented by the water route through Sabine Pass, via the Neches River. Lumber, shingles, live stock, rice, and oil also are shipped, and the manufactures include sawed and planed creosoted lumber, largely cypress shingles, oil-field and saw-mill machinery and supplies, also cars, furniture, ice, cottonseed oil, refined oil, food stuffs, and various petroleum products. Oil, which was discovered in extraordinary quantity, has made Beaumont an important refining centre, and since 1900 the city's growth has been very rapid. A project for deepening the canal

which extends from Port Arthur to the mouth of the Neches River is now under way. It will permit ocean-going vessels to ply directly to Beaumont and will cost about \$1,000,000. Near the city are enormous rice irrigating plants. Pop., 1900, 9427, 1910, 20,640.

BEAUMONT, bô-mônt, formerly bô-mônt, FRANCIS (1584-1616). An English poet and dramatist. **FLETCHER**, JOIN (1579-1625). An English poet and dramatist. These writers were so closely associated in their lives and labors that their names have become indissolubly united. Francis Beaumont was the third son of Francis Beaumont, one of the justices of the common pleas. He was born at Grace-Dieu, Leicestershire, in 1584. When 12 years of age he became a gentleman commoner of Broadgates Hall (now Pembroke College), but he left Oxford without taking a degree. In 1600 he was admitted a member of the Inner Temple. An expansion of one of Ovid's legends (1602) has been attributed to him. When about 19 years of age, he became the friend of Ben Jonson and wrote commendatory verses to some of his dramas. He became acquainted with Fletcher, probably in 1606, and they lived in the same house till Beaumont's marriage in 1613 to Ursula, daughter and coheir of Henry Isley, of Sundridge, in Kent, by whom he had two daughters. He died March 6, 1616, and was buried in Westminster Abbey.

John Fletcher was born in 1579. His father, Richard Fletcher, a clergyman, was at that time incumbent of Rye, in Sussex, thereafter he was appointed Dean of Peterborough and attended Queen Mary on the scaffold, whose last hours he imbibed with irrelevant exhortation. On his elevation to the see of London he married a second time and thereby incurred the disfavor of the Virgin Queen. A John Fletcher, of London, assumed to be the dramatist, entered Bene't College (Corpus Christi), Cambridge, on Oct. 15, 1591. It is uncertain how long this Fletcher remained at the university or whether he took a degree. *The Woman-Hater*, produced in 1607, is the earliest play of our author. It is not known precisely in what circumstances Fletcher passed his life. He asserts his independence in some verses introductory to *The Faithful Shepherdess*, published about 1610, yet he wrote more rapidly than most men then writing for bread. Waiting in London, it is said, for a new suit of clothes as he was about to go into the country, he caught the plague, and died (1625), and was buried in the church of St. Saviour.

The works of Beaumont and Fletcher comprise in all 64 plays (according to Play), but it is difficult to allocate, in any satisfactory manner, the parts written by each. A good deal, however, has been accomplished by the application of metrical tests. In some of the plays other hands have been traced, especially Massinger's. And certain passages in *The Two Noble Kinsmen* are by Shakespeare. The best work of this famous collaboration is represented by *Philaster* (mostly Beaumont's), the tremendous *Maid's Tragedy* (in which Beaumont's genius is dominant), and *The Faithful Shepherdess* (mostly Fletcher's), a beautiful pastoral drama, which furnished some hints to Milton for his *Comus* and to Keats for his *Endymion*. Beaumont and Fletcher are the cleverest, gayest gentlemen. They rarely sound the deep sea of passion, but rather play over its surface. They have little power of serious characterization, and their in-

merous creations are seldom consistent, but they say the most clever and pleasant things. Morally, little can be said in their praise. No audience of the present day could sit out the representation of their purest plays. Some of the impurest are almost beyond conception, yet there is always an air of good breeding about them. The songs distributed through their plays almost equal Shakespeare's in sweetness and beauty. Consult *Works*, with notes and memoir (ed. A. Dyce, 11 vols., London, 1843-46), and a second, two-volume edition by Dyce, 1852, "Selected Plays," in *Mermoid Series* (London, 1887). The best recent edition is that edited by Arnold Glove and A. R. Waller, 15 vols., in *Cambridge English Classics* (New York, 1905). G. C. Macaulay, *François Beaumont: A Critical Study* (London, 1883), A. W. Ward, *History of English Dramatic Literature* (1899), vol. 11. For exhaustive discussion of authorship of the various plays, Boyle, in *Englische Studien*, vol. lxxiv (Heilbronn, 1877-1901), id. in *New Shakespeare Society* (London, 1880-86), also Fleay in the latter publication for 1874, and Upham, *The French Influence in English Literature* (1910).

BEAUMONT, SIR GEORGE HOWLAND (1753-1827). An English painter and patron of art. He was born at Dunmore (Essex) and was educated at New College, Oxford, and from 1790 to 1796 sat in Parliament for Bealston. He made an extensive and fine collection of drawings and paintings and was among the first properly to estimate the work of Wilkie, Landseer, and Gibson. He was one of the founders of the National Gallery, to whose collection he made valuable additions. As a pupil of Richard Wilson, he did some amateur painting in landscapes, two examples of which now hang in the National Gallery. He was a friend of Sir Joshua Reynolds, Coleridge, and Wordsworth, who dedicated to him several poems, notably *Elegiac Musings* (1830).

BEAUMONT, bô'môn', JEAN BAPTISTE ELIE DE. See ELIE DE BEAUMONT.

BEAUMONT, bô'môn't, formerly bû'môn't, WILLIAM (1785-1853). An American surgeon, born at Lebanon, Conn. He is noted for discoveries in the processes of laws of digestion, made in watching the operations of the stomach in the case of Alexis Saint-Martin. On June 6, 1822, Saint-Martin, then supposed to be 18 years old, while at Mackinac, Mich., was accidentally shot, receiving the entire charge of a musket in his left side, the muzzle of the gun being about three feet from his body. This discharge fractured two of his ribs, lacerated his lungs, and lodged in his stomach. Dr. Beaumont, who was then stationed at Mackinac as a surgeon in the United States army, restored Saint-Martin to health within a year, though the aperture made by the shot was never closed. Two or three years afterward Beaumont commenced a series of experiments upon the stomach of the young man, studying its operations and secretions, the action of the gastric juice, etc. These experiments he continued from time to time, his patient presenting the spectacle of a man enjoying good health, appetite, and spirits, with an opening in his stomach through which the action of that organ could be satisfactorily noted from the exterior. Beaumont was the first to obtain the gastric juice through a fistula from a living human being, and he demonstrated beyond a doubt its chemical properties and

digestive powers. He published the result of his experiments in 1833. Afterward he resigned from the army, and practiced medicine in St. Louis, Mo., until his death.

BEAUMONT DE LA BONNINIÈRE, bô'môn' de la bô'né'nyâr', GUSTAVE AUGUSTE (1802-66). A French publicist. In 1831 he and Tocqueville were commissioned by his government to study the prison system of America. In 1839 he was elected deputy from Sarthe and sided with the so-called dynastic opposition. After the February Revolution of 1848 he was returned as a member of the Constituent Assembly and here maintained the character of a sincere but moderate Republican. He was appointed by Cavaignac Ambassador to England. One of the opponents of the coup d'état of 1851, he was imprisoned for some time in the fortress of Mont Valerien, and after regaining his liberty he lived in retirement. The writings on which his reputation rests are *Le système pénitentiaire aux États-Unis, et de son application en France* (2 vols., 1833—partly by Tocqueville), *Morie, ou l'esclavage aux États-Unis* (2 vols., 1835), *L'Irlande, sociale, politique, et religieuse* (2 vols., 1830-42).

BEAU NASH. See NASH, RICHARD, and JERROLD, DOUGLAS.

BEAUNE, bôn. A town of the department of Côte d'Or, France, in the ancient duchy of Burgundy, situated in a pleasant district on the river Bouzeise, about 23 miles south-southwest of Dijon (Map France, N. K 5). The town is well built, it has a remarkable thirteenth-century parish church (Notre Dame), and a fine hospital, founded in 1443 by Nicholas Robin, Chancellor of Philip the Good, Duke of Burgundy. A communal college, a library, and a museum are its chief public institutions. Its industries comprise distilleries, cloth factories, and the manufacture of vinegar. Beaune has an active commerce in vegetables and farm products and is the chief seat of the wine trade of Burgundy, giving its name to one of the best of the Burgundy wines. As early as the seventh century it was a fortress under the name of Belna, and had its castle and its ancient Pop., 1901, 12,896, 1906, 13,540, 1911, 13,409.

BEAUNE, FLORIMOND DE (1601-52). A French mathematician, born at Blois. He contributed not a little to the development of Descartes' method in geometry, and his notes on Descartes' celebrated *Géométrie* have been incorporated in Schooten's edition of that book. The so-called "Beaune's Problem" (which has been completely solved only by Jean Bernoulli), still given in the integral calculus, was for his time new and remarkable; it turns on the determination of the nature of a curved line from a property of its tangent. By contributions of this nature Beaune helped to pave the way for the integral calculus. He was also the first to treat systematically the question of superior and inferior roots of numerical equations (posthumous publication, 1659).

BEAUNEVEU, bô'n'-vê', ANDRÉ (active 1360-1403). A Flemish sculptor, painter, and illuminator of manuscripts. He was born at Valenciennes, Hamnault, and was the leader, with Sluter (q.v.), in the school of realistic sculpture in Flanders and northern France that anticipated the Italian Renaissance. After working in sculpture and painting at Valenciennes (1361-62) he went to Paris in 1364 and was made royal sculptor to Charles V,

whose mausoleum he executed, besides those of Philip VI, John II, and Jeanne de Bourbon—all surviving in the abbey church of Saint-Denis. After his return to Flanders in 1374 he worked at Malines (Communal Hall), made tombs at Courtrai, and a statue of the Virgin for the belfry of Ypres (1377). He then entered the services of Duke Jean de Berry, brother of the King of France, and the greatest art patron of his day, and in 1390 directed the latter's ambitious projects of sculpture and painting at the Château of Mehun. His finest remaining illuminations are in a psalter of the Duc de Berry in the Bibliothèque Nationale in Paris. His surviving statues are remarkable for masterly force and intense realism. Froissart calls him the greatest artist of his day. Consult Durrieu, in *Histoire de l'art*, ed. Andre Michel, vol. II (Paris, 1902), id. *Les miniatures de Andre Beauneveu* (Paris, 1894).

BEAUREGARD, bô'rê-gard', *Fr* pron bô'r-gar' or bô'r-gar', **Pierre GUSTAVE TOUTANT** (1818-93). A Confederate general, born in New Orleans. He graduated at West Point in 1838 and the same year became second lieutenant in the engineer corps. He was engaged in engineering work at Newport, Barataria Bay, and Fort McHenry until 1846, when he went to Mexico, distinguishing himself in the war there. He became captain of engineers in March, 1853, was engaged in the construction of fortifications at Mobile, Lake Pontchartrain, and New Orleans until 1860 and in November of that year was appointed superintendent of West Point, a position he resigned Feb. 20, 1861, to serve in the Confederate army. He was immediately made brigadier general and took command of Charleston, where, April 12-13, by the bombardment of Fort Sumter (q.v.), he began the Civil War. He was second in command at the first battle of Bull Run, July 21, and the next day was raised to the rank of general. At the battle of Shiloh, April 6-7, 1862, he was second in command the first day, and on the death of A. S. Johnston assumed chief command, subsequently withdrawing to Corinth, where he remained until May 29. In 1863 he defended Charleston against the attacks of Dupont and Dahlgren, and early in 1864 assumed command of the Department of North Carolina, which was enlarged to include Virginia south of the James. On May 16, at Drury's Bluff, he won an important strategic success over Butler. (See **BERMUDA HUNDRED**.) He then commanded at Petersburg, Va., where he retarded Grant's advance upon Richmond. He afterward served with the Division of the West, and surrendered with Johnston to Sherman, April 26, 1865. He was president of the New Orleans, Jackson, and Mississippi Railroad from 1865 to 1870, became Adjutant General of Louisiana in 1878, and for some years was manager of the State Lottery. He declined an appointment to the chief command of the Rumanian troops in 1866 and, three years later, a similar appointment from the Khedive of Egypt. Consult Roman, *Military Operations of General Beauregard* (New York, 1883).

BEAUREPAIRE-ROHAN, bô'rê-par' rô'an', **HENRIQUES DE** (c 1818-94). A Brazilian traveler and geographer, born in the province of Piahy of French extraction. In 1845 he began the exploration of territory south of Rio de Janeiro. He penetrated into Paraguay, subsequently publishing the results of his exploration in the work entitled *Descrição de uma*

viagem de Cuyabá ao Rio de Janeiro (1846). Afterward he was appointed by the Brazilian government to collect statistical information on the interior provinces of the country. He later became lieutenant general in the Brazilian army, and in 1877 published the important geographical work entitled *Estudos acerca da organização da carta geographica e da historia physica e politica do Brazil* (1877).

BEAUTEMPS-BEAUPRÉ, bô'tân' bô'p'rê', **CHARLES FRANÇOIS** (1766-1854). A distinguished French hydrographer, born at Neuville-au-Pont. He accompanied the expedition sent in search of La Perouse in 1791 and made valuable charts of many of the places visited then and subsequently, when he was employed in all the important hydrographic labors undertaken during the Empire and the Restoration. The perfection of his work earned him the name of "the father of hydrography." He was elected a member of the Academy of Sciences in 1810 and was appointed chief hydrographer and keeper of the dépôt of marine and the colonies in 1814.

BEAUTY, bû'ti. See **ÆSTHETICS**, ART.
BEAUTY AND THE BEAST. A story, first told in Straparola's *Facetiae novae* (1550), of a self-sacrificing daughter who accepts the addresses of a beast and later falls in love with him because of his kindness. This breaks the spell, and he regains his human form. There is a French version in Mme Villeneuve's *Contes marines* (1740), another by Mme Beaumont (1757). Among numerous English adaptations may be mentioned that of Miss Thackeray. It is also the basis of Gretry's opera, *Zemire et Azor*.

BEAUVAIS, bô'vâ' (from *Bellovacum*). The capital of the department of Oise, in the old province of Ile de France, France, situated in the valley of the Therain (a tributary of the Oise), 41 miles north-northwest of Paris and surrounded by rising woodlands (Map France, N, H 3). It is the seat of a bishop and contains a public library of 30,000 volumes, a museum, etc. Among its several fine buildings, the most noteworthy is its uncompleted cathedral of St. Pierre, which consists of nothing but a choir and transept of amazing proportions, built in the decorated Gothic style. It was begun in 1225 and was intended to rival that of Amiens. The Basse Œuvre is probably the nave of the former cathedral, a Romanesque building of great antiquity. The manufactures of Beauvais include woolen and military cloth, gold and silver lace, carpets, Gobelin tapestry, boots and shoes, etc. Beauvais carries on a brisk trade in grain and wine. Pop., 1906, 20,248, 1911, 19,841. It was included in the country of the powerful Bellovaci, in Gallia Belgica, and was known by the Romans as Caesaromagus, afterward as Bellovacum. The Jacquerie, or Peasants' War, broke out in the neighborhood of Beauvais, March 21, 1358. In 1472 the town was besieged by Charles the Bold of Burgundy, with an army of 80,000 men, when the women of Beauvais, under the leadership of the heroine, Jeanne Laine, surnamed La Hachette for her daring, joined in the defense. Consult Labande, *Histoire de Beauvais* (Paris, 1892).

BEAUX, bô, **CECILIA** (1863-) An American figure and portrait painter. She was born of French descent in Philadelphia, where she studied painting, at first "independently," then with William Sartain. Finally, in 1889

90 she worked abroad under several masters, being chiefly influenced by Robert Fleury and Charles Lasar. Thereafter she resided in New York, where she came to rank as one of the most able and popular portraitists, of women and children especially. Among her many honors are the medals of the Carnegie Institute, Pittsburgh (1899), the Exposition Universelle in Paris (1900), the Pan-American Exposition, Buffalo (1901), and the Dodge prize of the National Academy of Design (1902). She was made a member of the National Academy and of the Société Nationale des Beaux-Arts. Her best-known paintings include "Last Days of Infancy" (1885), portraits of her niece Ernesta and of the Rev. James Grier, "Sita and Sarita," "Cynthia" (Miss Sherwood), "The Dreamer," "Mother and Daughter," "A New England Woman" (Pennsylvania Academy), "Dorothea and Francesca," daughters of Richard Watson Gilder, and a portrait of Mr. Gilder himself, exhibited at the St. Louis World's Fair of 1904. One of the most striking pictures of the 1913 (spring) National Academy exhibition was her "Portrait Study." Miss Beaux unites with a fine feeling for color a freedom of brush work which contributes much to the pleasure-giving qualities of her art. There is no sense of effort conveyed in the manipulation of pigment, no impression of dull and heavy tones. Unconventional and characteristic poses and a remarkable rendition of the sitter's hands are a striking feature of work that is essentially modern and highly individual. Consult Mrs. Bell, in *The Studio*, vol. xvii (1899), and Isham, *History of American Painting* (New York, 1905).

BEAUX-ARTS, bô'zâr', ACADEMIE DES. One of the five academies of the Institut de France (q.v.). It is divided into five sections, Painting, Sculpture, Architecture, Engraving, and Musical Composition. Its membership numbers 41, including a secretary chosen for life who is not a member of any section, 10 honorary and 10 foreign associates, and 50 corresponding members. Its publications embrace transactions, memoirs, and the *Dictionnaire Général des Beaux-Arts*.

BEAUX-ARTS, ECOLE DES See **ECOLE DES BEAUX-ARTS**

BEAUX-ARTS ARCHITECTS, SOCIETY OF. An association of American graduates of the Ecole des Beaux-Arts, Paris, established in 1902. The society carries on a system of art education which includes the establishment in different cities of the United States of ateliers or schools in which instruction in architecture may be obtained. The instruction is based on that given in the Ecole des Beaux-Arts. In each city the ateliers are formed by a group of students who desire to carry on a study of architecture. The master or patron whose work is given free is chosen or appointed, and the atelier is supported by contributions from the students. The committee on education of the society issues each year a certain number of programmes which include problems to be worked out by the different ateliers. These competitions are designated "Class A" and "Class B" competitions. Ateliers are established in about 60 cities in the United States and Canada. Many colleges and universities also avail themselves of the programme of the society in their course of instruction. The society awards four prizes—the Warren prize, offered for general excellence in planning a group of buildings, the Pupin prize, the gift of Prof. M. I. Pupin of Columbia Uni-

versity for the decorative treatment of some scientific appliance, the Goelet prize, the gift of Mr. Robert W. Goelet for excellence in planning a city block, and the Bacon prize, the gift of Mr. Robert Bacon for the greatest number of honors obtained in "Class A." Mr. Bacon also offers annually a Paris prize, the winner of which is chosen to pursue his studies in the first class in the Ecole des Beaux-Arts in Paris. The winner of this prize receives \$250 quarterly for two years and a half, dating from his departure for Europe.

BEAUX' (bôz) STRAT'AGEM, THE See **FARQUHAR, GEORGE**

BEA'VER (AS *beofen*, Ger *Biber*, OCh Slav *bebrû*, Skt *babhrus*, large ichneumon, also "brown", to this latter root the word may possibly ultimately belong). A large aquatic rodent of the family Castoridae, remarkable for its constructive habits and yielding a valuable fur and the substance castoreum. The family includes only one species, in the opinion of the majority of naturalists, which is, or has been, distributed throughout most of the forested parts of the North Temperate Zone. To this species Linnaeus gave the name *Castor fiber*, and the American form has been regarded as merely a variety of it. Recent American specialists, like Rhoads (*Proc Am Philos. Soc.*, 1898), believe, nevertheless, that the American beaver is specifically different from that of the Old World, is entitled to the name *Castor canadensis*, and is divisible into three distinct local races. In general characteristics all beavers agree so closely, however, that these notions of classification may be left to the taxonomists.

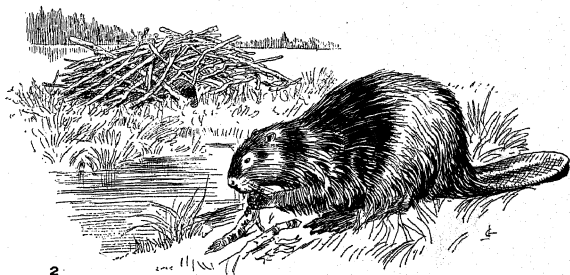
The *Old World Beaver*, once widely common throughout Europe and northern Asia, is now rare and isolated. Extinct in the British Isles since the twelfth century, a few colonies are preserved in the parks of the Marquis of Bute and other noblemen. It is said to exist in southeastern Norway, and isolated pairs are occasionally seen on some of the large German rivers, and in Austria, under protection of great landowners. "They also occur sparingly in Russia and Poland, in the streams of the Ural Mountains, and in those which flow into the Caspian. They live in burrows on the banks of rivers, like the water rat, and show little of the architectural instinct so conspicuous in the American form, but this may be owing to unfavorable external conditions rather than to want of the faculty, for there is a well-authenticated instance of a colony of beavers, on a small stream near Magdeburg, whose habitations and dam were exactly similar to those found in America." In Siberia they still exist in considerable numbers, though their pelts do not now figure largely in the export of furs, and there the animal is inclined to erect lodges and dams.

The *American Beaver* was scattered primitively over all wooded North America, from Mexico to Labrador and the northwestern limit of tree growth. It has been banished from all the more thickly settled parts, but survives in greater or less numbers throughout Canada north of civilized Ontario and Quebec, in the Rocky Mountain and Californian ranges, in the Appalachians south of West Virginia, and along the borders of northwestern Mexico. It is steadily decreasing, however, even in the Hudson's Bay region. The beaver is usually at least 2 feet in length from the nose to the root of the tail, and weighs about 35 pounds, and the

BEAVER, COYPU AND MUSKRAT



1



2



3

1. COYPU (*Myopotamus coypu*), carrying young.

2. BEAVER (*Castor canadensis*) and house.

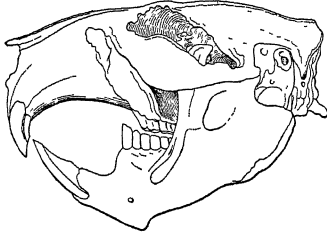
3. MUSKRAT (*Fiber zibethicus*), and winter lodge.

tail is about 10 inches in length. These dimensions are sometimes exceeded. The general form of the animal is thick and clumsy, broadest at the hips and squirrel-like. The body terminates in a thick oval tail, flattened transversely, about twice as long as broad, and naked of hairs, the surface being covered with plates of black, indurated skin, resembling horn scales. The fore limbs are small and squirrel-like, the hinder ones large and powerful. Each foot has five toes, those of the forefeet are short, and not connected by a web, those of the hind feet are long, spreading out like the toes of a goose, and webbed to the nails. In accordance with this remarkable peculiarity, the beaver in swimming makes use of the hind feet alone, the forefeet remaining motionless and close to the body. The tail is of service as a sculling oar and a rudder, and its loud slapping of the water when an alarmed animal dives is an effective signal of danger to others. The head is thick and broad, the nose obtuse, the eyes small, the ears short and rounded. The incisor or cutting teeth

circumference at the point of attack, but this was exceptional. This cutting is accomplished by the animals standing upon their hind feet and gnawing in parallel lines across the grain, then wrenching or biting out the chip between, and so steadily deepening the cut. The assertion that they can or do cause trees to fall in any desired direction is not justified by facts. Large trees are usually felled by the united efforts of a family of beavers.

Community Life and Architecture—The architectural operations and cooperative life of these animals are very wonderful, although the statement at one time commonly made, that beavers drive stakes into the ground, has no foundation in fact, and some of the other particulars which passed current along with it were equally fabulous. They dwell normally in colonies along streams, which may have been inhabited for scores of generations, and whose improvements represent the combined labor of thousands of individuals past and present. Such a colony begins by the settlement in the spring upon some sluggish, moderately deep woodland stream or pond of a pair of young beavers, who have emigrated thither from some old colony. Their first labor is to dig a burrow in the bank, the entrance to which is at a safe depth beneath the water, and the interior chamber at a safe height above its normal rise. In this burrow they make their home the first year, or perhaps two years, and such burrows, more or less in use and serving as refuges in danger, are common always in beaver settlements. It is essential that a sufficient depth of water be maintained before the door of this burrow to give clear ingress and egress under the winter's ice and to afford room for storage of winter provisions, and in most places chosen by the animals this can be arranged only by damming the stream. As the droughts and low water of summer begin, therefore, the beavers seek a place in the stream a little below their residence, where it is narrow, not more than $2\frac{1}{2}$ feet deep and has a firm bottom, and begin a dam. Gnawing down saplings 10 or 12 feet long, they drag and float them to the spot, and sink them lengthwise, side by side, across the current, beginning at the centre of the channel and loading them with stones, sods, and mud, to keep them in place. They will handle remarkably large stones for this purpose. The work is gradually extended until it reaches the bank on each side, and in doing so a convex outline upstream is usually given, but this probably is an accident of the increasing pressure of the obstructed current on the progressing wings of the new dam rather than an engineering design, for reverse (or weak) curves are frequently seen. Such a dam grows constantly by the addition of all sorts of material—not only the logs and sticks from which the bark has been gnawed for food, but others cut for the purpose, and a constant intermixture of roots and branches with stones, moss, grasses, and mud.

Additions, as well as constant repairs, are made on the upper side, which comes to present a low slope and comparative solidity, while the lower front of the dam is a more abrupt tangle of sticks and branches. The beavers work at the dam only at night, except in an emergency, and each one does what it thinks proper in a quite independent way, though the result is for common benefit. After many years such dams may be 4 or 5 feet high at the channel and



SKULL OF A BEAVER
Showing the chisel-like incisors

(two in each jaw) exhibit in the highest perfection this cardinal characteristic of the Rodentia. They are formed in front of hard, orange-colored enamel, while the back of the tooth is formed of a softer substance, more easily worn down, so that a sharp, chisel-like edge is always preserved, the bulbs being also persistent, so that the teeth are continually growing as they are worn away. There are four flat molar teeth (or grinders) on each side in each jaw.

The fur consists of two kinds, the longer hair comparatively coarse, smooth, and glossy, the under coat dense, soft, and silky. The color is generally chestnut, rarely black, spotted, or nearly white. The largest and reddest beavers are those dwelling on the streams of the northern Pacific coast, the smallest and darkest those of the Hudson's Bay region, while those inhabiting the southern Alleghenies are reddish brown, and those of the southern Rockies are pale. In consequence of its aquatic and bark-eating habits, the beaver is limited to the neighborhood of streams and ponds in wooded districts, and the northern range of the species is everywhere terminated by the limits of the forest growth. Its extraordinary powers of gnawing are exerted to cut down trees several inches in diameter, both for food and for the construction of those houses and dams which have rendered it so much an object of admiration to mankind. Dr. Elliott Coues mentions a poplar cut by beavers on the upper Missouri, which he found to be 9 feet in

stretch to the right and left across low ground for 50 yards or more, converting the space above it into a broad, grassy pond, having a network of clear channels. Morgan describes dams 600 feet long in northern Wisconsin, with many acres of flooded ground. The water does not flow over the tops of these dams, but percolates through them, though some of them become seemingly solid barriers of earth. "In places," says Hearne, "which have been long frequented by beavers undisturbed, their dams, by frequent repairing, become a solid bank, capable of resisting a great force, both of water and ice, and as the willow, poplar, and birch generally take root and shoot up, they by degrees form a kind of regular planted hedge, which I have seen in some places so tall that birds have built their nests among the branches." A large proportion of the marshy ponds and peat bogs of the country have had this origin.

Meanwhile, from the first summer onward, the gradually increasing number of beaver families have built each for itself permanent homes, known from their resemblance to the Algonkian wigwam as "lodges." The sites chosen are along the banks of the stream or canal, and several houses may be so close together as to touch, or they may be widely scattered. The larger lodges are, in the interior, about 7 feet in diameter, and between 2 and 3 feet high, with the floor and inner walls made smooth by gnawing and wear. The entrances are always two, both leading down into the water, and in northerly regions there is no opening into the air—a careful precaution against the cold of midwinter as well as against such insidious foes as weasels and black snakes. This structure, like the dam, is formed of branches of trees, matted with mud, grass, moss, and other material. The walls are very thick, and the entire structure not only secures much warmth, but is an efficient protection from wolves, wolverines, and other beasts of prey, especially when solidly frozen in winter. Each family builds, maintains, and occupies its own lodge, the current belief that several families live together arising from the fact that the young beavers usually continue to live with their parents until the third year. Single "bachelors" dwelling remote and alone are occasionally seen.

Food and Winter Provision.—The food of beavers is almost wholly the bark of deciduous trees, especially poplar, birch, willow, linden, and maple, they never eat "evergreen" bark, and are absent from forests exclusively coniferous. In the summer they gnaw at fresh bark day by day, and also eat more or less of lily roots and other green vegetables, berries, and leaves. The impossibility of obtaining this food in winter, when the waters and woods are clogged with ice and snow, compels them to prepare a supply. For this purpose the beavers become very active in the autumn, each family cutting down large trees and gnawing their limbs and trunks into sections small enough to be dragged to the water and floated to the neighborhood of their lodge. There this material is sunk to the bottom and firmly anchored until a sufficient supply has been acquired. The method of anchoring this winter's supply has long been a matter of speculation. The green wood is about as heavy as the water, and once in the pond it soon sinks of itself, becoming water-logged. The first few pieces of the winter's food are usually large and irregular, and these are usually placed in a

rough circle with the butts inward. This forms an entangling foundation which serves to hold in place the smaller pieces piled on top. In swift water anchorage for the first few pieces is secured by placing them on the lower slope of the house or against the dam. A carefully watched colony of beavers gathered 732 sapling aspens and several hundred willows for the coming winter, forming a pile almost wholly below the water, over 3 feet deep and 124 feet in circumference. Roots of water lilies and other aquatic plants are also stored to a less extent. The dams are also especially repaired in autumn. The freezing of the stream puts an end to their labors, whereupon the beavers retire to their lodges and remain there, subsisting upon their store, pieces of which are daily taken into the house, or into some bank burrow, and the bark is eaten.

It will readily be seen that the supply of edible wood within a manageable distance from the water would soon be exhausted by a beaver colony, and perhaps the most important service of the dam and its pond is to provide against this contingency. In a flat country the mere raising of the water by flooding spaces of woods answers the purpose to some extent, but this is most intelligently supplemented by the animals, who dig deep canals, 2 or 3 feet wide, which penetrate the woods in various directions, sometimes for 100 yards or more, and thus render accessible a large number of trees otherwise out of reach. These canals are kept open with great pains, while the rest of the pond becomes gradually grown up with grass, and they form avenues along which lodges and burrows are placed, and where the colony may swim freely and float their food and building materials from the woods to their lodges and dams, of which latter, on a long-tenanted and favorable stream, several may exist. This perfection of beaver economy is by no means seen everywhere, but might commonly be observed previous to 1850 in such highly favorable regions as the swampy forests about the headwaters of the Mississippi, and it is being renewed in northern Maine, where, under the protection of law, beavers are increasing and reoccupying their ancient haunts.

Economic Considerations.—Beavers are closely related to the squirrels, and, like them, "sit up" a great deal, holding their food up to their mouths in their fore paws, which otherwise are used very dexterously. The animals live well in confinement, and colonies are flourishing in zoological gardens and parks in New York, Washington, and other American cities, as well as abroad, where small, watered valleys, fenced with wire, are devoted to them. In closer captivity they betray their constructive instincts by weaving the sticks supplied them into the bars of their cages. They have usually four young at a birth and keep them at home for two years. In 1913, beavers bred for the first time in their pond in the New York Zoological Park.

The fur of the beaver, by reason of its softness and density, is one of the most valuable yielded by any animal, and in former times was the staple of the fur trade, especially in America, when the early prosperity of Canada and New York was based upon it. (For statistics see *FUR AND THE FUR TRADE*.) It is probable that only the invention of silk-plush applied to the making of hats saved the animal from extinction long ago. Beavers were obtained mainly

by wasteful methods of trapping, and they are so obtained yet and chiefly in winter. Their nocturnal habits and extreme shyness make the shooting of them impracticable. Their flesh is esteemed by the Indians and frontiersmen.

Large glandular pouches, two in number, closely connected with the organs of reproduction, contain the substance called *castoreum* (qv). Its uses in the animal economy are by no means well known, they are probably analogous to those of musk and civet, but its peculiar pungent odor is so attractive to beavers that use is made of it as a bait for beaver traps.

The beaver family dates from the middle of the Tertiary Period, a fossil species of very large size occurring in the Upper Pliocene of Europe. Fossils of a small size and some peculiarities are found in the Miocene of the United States.

Bibliography. Consult Harting, *British Animals Extinct within Historical Times* (London, 1880), Morgan, *The American Beaver and his Works* (Philadelphia, 1868), H. T. Martin, *Casertologia* (Montreal, 1892), and especially E. A. Mills, *In Beaver World* (Boston, 1913), standard works (see MAMMAL). Compare *COTUR*.

BEAVER. A borough, and the county-seat of Beaver Co., Pa., 23 miles northwest of Pittsburgh, at the confluence of the Ohio and Beaver rivers, on the Pittsburgh and Lake Erie and the Pennsylvania railroads (Map Pennsylvania, A 5). It is the seat of Beaver College (M. E.), opened in 1853, and was the home of Senator Matthew S. Quay, of Pennsylvania. Beaver was settled about 1700. The water works are owned and operated by the borough. Pop., 1900, 2384, 1910, 3456.

BEAVER, JAMES ADDAMS (1837-1914). An American soldier and politician, born at Millers-town, Pa. He graduated at Jefferson College (Canonsburg, Pa.) in 1856 and practiced law from 1859 to 1861. From 1861 to 1864 he served in the Federal army and in the latter year was mustered out with the rank of brevet brigadier general. From 1887 to 1891 he was Governor of Pennsylvania. In 1896 he was appointed judge of the Superior Court of Pennsylvania and was reappointed in 1906.

BEAVER DAM. A city in Dodge Co., Wis., 64 miles by rail northwest of Milwaukee, at the outlet of Beaver Lake, and on the Chicago, Milwaukee, and St. Paul and the Chicago and Northwestern railroads (Map Wisconsin, E 5). The city has parks, a public library, a hospital, an armory, an opera house, and Wayland Academy. It is situated in a fertile agricultural region, has good water power, flour and woolen mills, canning factories, and breweries and manufactures of machinery, lumber, ranges, and seeding machines. Settled in 1841, Beaver Dam was incorporated in 1856. It is governed by a mayor, elected biennially, and a city council. Pop., 1900, 5128, 1910, 6758.

BEAVER DAM CREEK, BATTLE OF. See MECHANISVILLE, BATTLE OF.

BEAVER FALLS. A city in Beaver Co., Pa., 31 miles by rail northwest of Pittsburgh, on the Pennsylvania and New York Central railroads, and on the Beaver River, five miles from its confluence with the Ohio River (Map Pennsylvania, A 5). It is in a region abounding in natural gas and coal and has manufactures of steel, automobile accessories, enamel signs, glass, clay, pottery and tile products, axes, shovels, tubing, and gas engines. The city contains Geneva College (Ref. Presb.), organized 1848, the

Providence Hospital, and a Carnegie library. Beaver Falls, originally called Brighton, was chartered as a borough in 1868. It adopted the commission form of government in 1913. Pop., 1890, 9735, 1900, 10,054, 1910, 12,191.

BEAVER INDIANS. An important Athapascan speaking tribe on the Peace River, Canada. Linguistic evidence indicates some relation to the Plains-dwelling Sarsi (qv).

BEAVER ISLANDS. A group of islands in Lake Michigan, about 40 miles west of the Straits of Mackinac and forming part of Charlevoix Co., Mich. (Map Michigan, D 3). They derive their name from the largest of the group, Beaver Island. The township of St. James, on Beaver Island, had a population in 1910 of 685, Peane township having 370 inhabitants. A lighthouse is maintained at the northeastern end of Beaver Island. The Mormons made an unsuccessful attempt to found a settlement there in 1846.

BEAVER STATE. Popular name of Oregon. See STATES, POPULAR NAMES OF.

BEAVERWOOD. See MAGNOLIA.

BEAZLEY, CHARLES RAYMOND (1868-) An English geographer and historian, born at Blackheath. He was educated at King's College, London, and at Oxford. Subsequently he became professor of history at the University of Birmingham. The Gilt Memorial of the Royal Geographical Society was awarded to him in 1907 for his *Dawn of Modern Geography* (3 vols., 1897-1906). In 1908 he was Lowell Lecturer in Boston, Mass., and he also visited and lectured at several American universities in this same year. Besides articles published in the *Atlantic Monthly*, *American Historical Review*, and *London Geographical Journal*, he is the author of *James of Aragon* (1890), *Hemly the Navigator* (1895), *John and Sebastian Cabot* (1898), *Voyages of Elizabethan Seamen* (1907).

BEBERINE (from *bebery*, the native name of the tree) A bitter alkaloid occasionally used in medicine, in the form of its sulphate, as a substitute for quinine, and, on account of its stimulating action on the stomach, as a stomachic. It is obtained from the bark of the greenheart tree (*Nectandra rodia* of the order Laurineae), indigenous to British Guiana.

BEBERU. See GREENHEART.

BEBEL, br'bel, FERDINAND AUGUST (1840-1913) A leader of the Social-Democratic party in Germany. He was born at Cologne, set up as a master turner at Leipzig in 1864, identified himself with the Socialistic movement among the working classes, and in 1867 became chairman of the permanent committee of the German workmen's unions. In 1869 he assisted at Eisenach in founding the Social-Democratic party, which was closely affiliated with the International Workmen's Association, established at London by Karl Marx. He was accused in 1872 of projected high treason against the Kingdom of Saxony and the German Empire, and of *lèse-majesté* against the German Emperor. On the combined charges he was sentenced to imprisonment for two years and nine months. His incarceration on these and subsequent charges, however, served only to increase his prestige among his party associates. In 1867 he was elected deputy to the North German Diet, and after 1871 he was almost continuously in the Reichstag, representing successively the districts of Rappachau-Meerane, Dresden, Strassburg, and Hamburg. In 1868 he

became connected with the staff of the *Volksstaat* at Leipzig and in 1891 with that of the *Vorwärts* at Berlin. Bebel became known as an effective orator and as the most influential member of his party. He represented the Marx tradition of the Social-Democrats and for this reason was attacked on the one hand by the "opportunists" of the Volmar school and on the other by the "extremists" or "impossibilists." He successfully opposed the efforts of Bernstein in the Congresses of Lübeck (1902) and Dresden (1903) to induce cooperation on given points with the old liberal parties. He received 175 votes for President of the Reichstag in 1912. His publications include *Der deutsche Bauernkrieg* (1876), *Die parlamentarische Tätigkeit des deutschen Reichstags und der Landtage* (1876), *Die Frau in der Vergangenheit, Gegenwart, und Zukunft* (1883), later as *Die Frau und der Sozialismus* (33d ed., 1902, Eng. trans. by Daniel De Leon, New York, 1904), *Charles Fourier* (1888), *Die Mohammed-arabische Kultur Periode* (1889), *Die Sonntagsarbeit* (1888), *Die Lage der Arbeiter in den Backereien* (1890), *Die Sozialdemokratie und das allgemeine Wahlrecht* (1895), *Für Volkswehr gegen Militarismus* (1898), and his memoirs *Aus meinem Leben* (3 vols., 1910-12, Eng. trans. by Ernest Untermann, under the title *My Life*, New York, 1911-12).

BEBEL, HEINRICH (1472-1518). A German humanist. He was born at Ingstetten (Württemberg). He studied at Cracow and Basel, and in 1497 was appointed professor of eloquence and poetry at the University of Tübingen. In 1501 he was crowned poet laureate by the Emperor Maximilian. His best-known works are his *Proverbia Germanica* (1508, new ed., Leyden, 1879), *Facetae* (1506), a collection of jests and anecdotes directed against the Roman Catholic clergy, and the satirical poem *Triumphus Veneris* (6 books, 1509). He was a friend of Erasmus. For his biography, consult Heinrich B. Zapf (Augsburg, 1802).

BECCAFICO, bĕk'kă-fĕ'kô (It. from *beccare*, to peck + *fico*, fig). An Italian name given in the south of Europe to various small and elegant warblers (Sylviidae), used as table delicacies, and specifically to the olive-brown garden warbler or pettychaps (*Sylvia hortensis* or *borm*), migratory in England. It haunts the fig orchards and vineyards and pecks holes in the rind of the ripening fruit, seeming to prefer to all others the variety of fig known in Italy as "fetifero." The damage done is slight, however, and some persons believe that in each instance the bird has found and removed an insect attacking the fruit. After fattening in the autumn upon this fruit their flesh becomes a dainty for the table, and they are shot for market in great numbers, though each affords hardly more than a mouthful of food. See FIG.

BECCAFUMI, bĕk'kă-fŭ'mă, DOMENICO, also called IL MECHERINO (1486-1551). An Italian painter and sculptor. He was the son of Giacomo de Pace, a peasant laborer on the estate of Lorenzo Beccafumi, a wealthy citizen of Siena, who took the boy into his service, and fostered his natural taste for art by placing him in the studio of Capanna in Siena, and afterward sending him to study in Rome. In his best work, painted in rivalry with Sodoma, he approaches that master in excellence, but his later productions are mannered and soulless. His most famous achievement was his series of designs for

scenes from the Old Testament for the wonderful pavement in the cathedral of Siena. For years the best artists worked upon this pavement, which was of white marble, the subject being engraved in black outline, and the border inlaid with magnificent patterns of varied colors. Beccafumi was occupied on this work 1517-25, in 1544 and in 1546. His best-known paintings are the frescoes on the ceiling of the city hall in Siena and an altarpiece in the museum there—his masterpiece. His last years were devoted principally to sculpture, particularly to 18 bronze figures of angels and 12 marble apostles for the cathedral of Siena. He was also an engraver of note, both on copper and wood. For the celebrated wood engravings of Beccafumi's pavement, see ANDREANI, ANDREA.

BECCARI, bĕk'kă-rĕ, ODOARDO (1848-). An Italian naturalist. He was born at Florence and studied at Lucca and Pisa. The three years from 1865 to 1868 he spent in Borneo, and from 1871 to 1876 he traveled in Celebes, New Guinea, and other of the East Indies. The results of his researches were published in the *Nuovo Giornale Botanico Italiano*, which he had founded in 1869, and in the *Bollettino della Società geografica italiana*. He is also the author of a work, in two volumes, entitled *Malesia raccolta d'osservazioni botaniche* (1884-85) and also *Nelle foreste di Borneo, viaggi e ricerche di un naturalista* (1902).

BECCARIA, bĕk'kă-rĕ'a, CESARE BONESANO, MARQUIS OF (1735-93). An Italian economist and jurist, born in Milan. The opinions of the French encyclopedists, as well as those of Montesquieu, had the greatest influence on the development of his thought. He wrote on the currency and other economic subjects, but his greatest work was his *Trattato dei delitti e delle pene* ('Treatise on Crimes and Punishments'), first published in 1764, in which he argues against capital punishment and which established his fame as the originator of more humane methods in dealing with criminals. The work was extremely popular, passing through six editions within 18 months, and was translated into many European languages. Kent unfairly accuses the author of an affected humanity, but did expose the invalidity of some of the arguments brought forward. Beccaria was among the first to advocate the beneficial influence of education in lessening crime. In 1768 Beccaria was appointed professor of public law and economy at Milan and achieved great success as a lecturer. His lectures are published in the Italian collection, *Scrittori classici italiani*, vols. xi and xiv, where also a biographical sketch will be found. A translation of his essay on "Crimes and Punishments" is included in J. A. Farrar's *Crimes and Punishments* (New York, 1872; London, 1880).

BECCARIA, GIOVANNI BATTISTA (1716-81). An Italian physicist. He was professor of experimental physics at Rome, Palermo, and Turin. In 1759 he was commissioned to measure an arc of a meridian in Piedmont. His principal works are *Dell'elettricismo naturale ed artificiale* (Turin, 1753) and *Dell'elettricismo artificiale* (Bologna, 1772). He made a great many experiments with atmospheric electricity, having been the first to demonstrate the existence of "free electricity."

BÊCHE-DE-MER, bâsh'de-mâr' (Fr. sea spade). A holothurian. See TREPANG.

BECHER, bĕk'ĕr, JOHANN JOACHIM (1635-82). A German chemist, born at Speyer. He

acquired an extensive knowledge of medicine, physics, chemistry, and economics, then taught and practiced medicine at Mainz. Later he founded a chemical laboratory at Munich, and in 1660 he was called to Vienna to inaugurate extensive commercial and industrial establishments. Becher had many enemies and was accused—not altogether unjustly—of charlatanism. In his *Physica Subterranea* (1669) we find the first clear mention of the imaginary fiery principle ("*terra pinguis*"), which afterward, under the name of phlogiston, played so important a rôle in chemical theory. Consult Erdberg-Kroczeniewski, *Johann Jochem Becher* (Jena, 1896).

BECHER, SIEGRIED (1806-73). An Austrian political economist, born at Plau (Bohemia). He studied at Prague and Vienna, was appointed professor at the Polytechnic Institute, Vienna, in 1835, and from 1848 to 1852 was employed in the ministry of commerce. His works include *Das österreichische Münswesen von 1524-1838* (2 vols, 1838), *Statistische Uebersicht des Handels der österreichischen Monarchie mit dem Auslande während der Jahre 1829-38* (1841), *Ergebnisse des Handels- und Zollverkehrs der österreichischen Monarchie von den Jahren 1819-43* (1846), *Die Volkswirtschaft* (1853).

BECHSTEIN, BERTHOLD, JOHANN MATTHAUS (1757-1822). A German naturalist, born at Waltershausen (Gotha) and educated at Jena. In 1795 he founded the school of forestry at Waltershausen and in 1800 was appointed director of the Academy of Forestry at Dreissigacker. He published *Die Forst- und Jagdwissenschaft nach allen ihren Theilen* (14 vols, 1818-27), *Abbildungen naturhistorischer Gegenstände* (8 vols, 1796-1810), *Naturgeschichte der Hof- und Stubenvogel* (1792, 5th ed, 1870).

BECHSTEIN, LUDWIG (1801-60). A German novelist, poet, and scholar born at Weimar. He first studied pharmacy, but subsequently devoted himself to the study of philosophy, literature, and history at the universities of Leipzig and Munich and in 1831 was appointed librarian of the Ducal Library at Meiningen. He was a learned student of Germanic folklore, wrote novels, epic and lyric poetry, but is now chiefly known for his collection of fairy stories. His publications include the poems *Der Totentanz* (1831) and *Luther* (1834), the novel *Das tolle Jahr* (3 vols, 1833), the tale, *Fahrten eines Musikanten* (1836-37), and the *Deutsches Märchenbuch* (1845, 45th ed, 1896), and *Neues deutsches Märchenbuch* (1856, 64th ed, 1895).

BECHUANALAND, be-chwa'-na-länd. A name formerly applied to the region in southwest Africa inhabited by the Bechuanas (qv) (Map Cape Colony, H 4). It included the crown territory of Bechuanaland (area 51,254 square miles, pop. 99,538), annexed to the Cape Colony since 1895, and the Bechuanaland Protectorate. The latter comprises all the territory bounded by the Molopo and the Zambezi rivers, the Transvaal province, Southern Rhodesia, and German Southwest Africa. Its area is estimated at 275,000 square miles. Bechuanaland is for the most part a high plateau, with an elevation of from 4000 to 5000 feet. In spite of its almost tropical situation the climate is only a little inferior to that of the Cape province and is very healthful for Europeans. The country is poorly watered, and there are several dry river beds, which fill up during the rainy season. The chief industry is cattle raising.

The protectorate is administered by native chiefs under the guidance of a British resident commissioner. The revenue is derived from customs and a hut tax, the latter collected by native chiefs. The Rhodesia Railways section of the "Cape-to-Cairo" line crosses the protectorate. The population (125,350 in 1911, of whom 1692 white) is made up of the Bamangwato, Bakhatla, Bakwena, Bangwaketse, Bamalete, and other tribes. They have their fixed boundary lines and have retained some of their political institutions. Consult *Annual British Colonial Reports* (London), Macnab, *On Veldt and Farm* (London, 1900).

BECHUANAS, be-chwa'-naz. Tribes of Bantu stock in the Transvaal Colony and centre of South Africa, among the most important of which are the Bakwena and Bamangwato. In this area they rank second only to the Kaffir so far as their historical importance is concerned. In response to civilizing influences and from natural adaptability the Bechuanas are among the most advanced nations of Africa. Their strong military and political organizations are shown in the formation of powerful native "kingdoms" and the extensive migratory movements of the tribes, though they are peaceable in disposition and skilful agriculturists. Kaffir corn (sorghum) forms the main crop. The women cultivate the soil, while the men tend the herds, which are kept for milk rather than for meat. Before the extinction of the larger mammals the chase was of some economic importance. In the manufacture of the skin cape ("kaross") and in fact in skin work generally the Bechuana excel all other South African tribes. They are also noted as blacksmiths. Their habitations are far more complex than those of the Zulu. A thatched roof is supported by a circle of tree trunks and a central pole, the walls, which do not touch the roof, are of wattle and daub, and there is also a courtyard, while a veranda is obtained by flattening one side of the wall, causing the eaves to project and raising a low platform underneath. At puberty both boys and girls are obliged to undergo a severe course of training. Totemism prevails, and "rain doctors" exercise much influence. In color they are brown rather than black, their height averages 1.684 meters.

BECK, ADAM (1857-) A Canadian legislator. He was born at Baden, Ont., and was educated at Rockwood Academy and Galt Grammar School. After succeeding as a manufacturer he became interested in municipal affairs and in 1902-04 was mayor of London, Ont. In 1902 he was elected to the Ontario legislature, and in 1905 was appointed a member, without portfolio, of the Conservative cabinet of Sir James Pliny Whitney, the Ontario premier. He became prominently identified with the work of developing and distributing electric power, generated at Niagara Falls, to the people of Ontario, and in 1906 introduced legislation creating the Hydro-Electric Power Commission, of which he was appointed chairman.

BECK, CARL (1856-1911). A German-American physician, born at Neckargemünd, Baden. He studied at the universities of Heidelberg, Berlin, and Jena, came to the United States in 1882, and was appointed surgeon to St Mark's Hospital, New York City, in 1886. Subsequently he became professor of surgical pathology in the College of Physicians and Surgeons of Chicago. He published a *Manual of Surgical Anesthetics*.

(1895), a *Text-book on Fractures* (1900), *Amerikanische Sticflichter* (1905), and *Surgical Diseases of the Chest* (1907)

BECK, CHRISTIAN DANIEL (1757-1832) A German scholar of distinction. He was born at Leipzig and studied at the university there. In 1785 he was appointed professor of Greek and Latin literature at the university and in 1819 professor of history. In 1825 he resumed the former chair. His method of literary instruction was historical rather than critical. From 1819 until his death he was editor of the *Allgemeines Repertorium der neuesten in- und ausländischen Literatur*. His works include the following: *Anleitung zur Kenntnis der allgemeinen Welt- und Volksgeschichte* (4 vols, 1787-1807), *Commentarii Historici Decretorum Religionis Christianæ et Formulæ Lutheranae* (1801), *Commentarii Societatis Philologicae Lipsiensis* (1801-04), and editions of Aristophanes (with Invenizzi and Dindorf), Pindar, Euripides, Thucydides, Pædo Albinovanus, and Calpurnius Siculus, Apollonius Rhodius, Plato, and Cicero.

BECK, JAMES BURNIE (1822-90) An American politician, born in Dumfriesshire, Scotland. He graduated at the law school of Transylvania University, Lexington, Ky., and from 1866 to 1875 was a member of Congress. From 1876 until his death he was United States Senator from Kentucky. He was a member of the commission appointed to define the Maryland-Virginia boundary and was prominent in the discussion of tariff and currency questions.

BECK, JOHANN HEINRICH (1856-) An American composer and conductor. He was born at Cleveland, Ohio. In 1879-82 he was a pupil of the Leipzig Conservatory, where he studied violin and composition. In 1895 he conducted the Detroit Symphony Orchestra, and in 1900 he became conductor of the Cleveland Symphony Orchestra. His works include a cantata *Deukalion*, a symphonic tone poem *Aus meinem Leben*, an overture to Byron's *Lara*, an overture *Romeo and Juliet*, a *Moorish Serenade*, a string sextet.

BECK, JOHANN TOBIAS (1804-78) A German theologian, born at Balingen, in Württemberg. He studied theology at Tübingen (1822-26), spent several years in the ministry, and was a professor, first at Basel, and then, after 1843, at Tübingen. He believed in orthodox Bible Christianity and was opposed to the "Tübingen School," which then flourished under the leadership of his fellow professor, F. C. Baur. Among his numerous publications, *Outlines of Biblical Psychology* (1877) and *Pastoral Theology of the New Testament* (1885) have been published in English. For his life, consult Riggenbach (Basel, 1887). Consult Adolf Schlatter, "J. T. Beck's theologische Arbeitsmethode" in *Beiträge zur Förderung christlicher Theologie* (4 vols, 1904).

BECK, KARL (1817-79) An Austrian poet, born of Jewish parents in Baja, Hungary. He studied in Vienna and Leipzig, lived in Berlin from 1844 until the outbreak of the Revolution of 1848, and subsequently in Vienna, where he was an editor of the *Lloyd*. Introduced to the literary world by Kuhnle, the editor of *Die elegante Welt*, he made his first great success with his *Nächte, gepanastete Lieder* (1838). His poetic writings skillfully interpret the national life and spirit of Hungary. *Jankó, der ungarische Rosshirt* (1842, 3d ed, 1870) is consid-

ered by many his best work. Other volumes are *Gesammelte Gedichte* (1844, 9th ed, 1869) and *Aus der Heimat* (1852, 4th ed, 1862). Consult Heinrich Nellen, *Aus Karl Beck's dichterischen Frühzeit* (Münster, 1908).

BECK, LEWIS CALED (1798-1853) An American physician, chemist, and mineralogist, born in Schenectady, N. Y. He graduated at Union College in 1811, was professor of chemistry in Rutgers College, and later in Albany Medical College. He was the author of a number of books and papers on botany and chemistry, also of an elaborate report on the mineralogy of New York, based upon his researches as mineralogist of the New York Geological Survey of 1835-41, which was published as one of the volumes of the *Natural History of the State of New York* (1842).

BECK, RICHARD (1858-) A German geologist, who has contributed much to the science of ore deposits. He was born at Aue and pursued the study of the natural sciences at the universities of Leipzig and Freiburg. In 1883 he joined the staff of the geological survey of Saxony, on which he served until his appointment, in 1895, to the professorship of geology at the Mining Academy of Freiberg. During his work in Saxony he published many reports relating to the aërial geology of that country, as well as special investigations in the fields of petrology and economic geology. In 1900 appeared his *Lehre von den Lagerstätten*, a work that has been translated into French and English (New York, 1905) and a standard for the study of the physical features and origin of the metalliferous deposits.

BECKE, BEKE, FRIEDRICH (1855-) An Austrian mineralogist and geologist, who became in 1898 professor of mineralogy at the University of Vienna. Born at Prague, he pursued the study of natural science at Vienna, where, on the completion of his training, he served for a time as lecturer in the geological sciences. He received an appointment to the University of Grenowitz in 1882, to Prague in 1890, and from there was called to Vienna, where he succeeded Tschermak in the chair of mineralogy and took up the editing of the periodical, *Mineralogische und Petrographische Mitteilungen*, founded by his predecessor. He is the author of many papers on geology and mineralogy, but his best-known contribution perhaps is a method for the determination of rock-forming minerals by means of their light-refractive properties, published by the Vienna Academy in 1893.

BECKE, GEORGE LEWIS, pen name LOUIS BECKE (1857-1913) An Australian novelist born at Port Macquarie, New South Wales. Becke wrote single-handed and with Walter Jeffery many tales of adventure in the Pacific islands, where the lawless white man corrupts the native. His best work deserves to rank with the short stories of Kipling and of Dawson. Among these writings are *By Reef and Palm* (1894, reissue, 1913), *Rodman the Boat-Steerer, Adventures of a Supercargo: The Ebbing of the Tide* (1896, reissue, 1913); *Pacific Tales* (1897), *Wild Life in Southern Seas* (1897), *The Mutineer* (1899), with Walter Jeffery, *Ridan the Devil* (1899); *The South Sea Pearler* (1900), *Tom Walrus* (1900, 1913), *The Tapu and Other Stories* (1901), *By Rock and Pool* (1901); *Breachley Black Sheep* (1902), *The Jelassoo Brig* (1902); *Helen Adair, Chunkey's Flats* (1903), *Tom Gerrard* (1904);

Notes from my South Sea Log (1905), *Sketches from Normandy* (1906), *The Adventures of Louis Blaise* (1909) See AUSTRALIAN LITERATURE

BECKENHAM, bek'en-am A town in Kent, England, 8½ miles southeast of London, with two stations on the London, Chatham, and Dover Railway. The municipality owns an electric lighting plant and public baths and maintains a technical institute. It is a residential suburb of London, and its most noteworthy building is the church of St George, the tower of which was completed in 1903, and contains bells in memory of Cecil Rhodes. Pop., 1901, 20,700, 1901, 26,300, 1911, 31,692.

BECKER, August (1828-91) A German journalist and novelist, born at Klingenmünster. He studied at Munich, from 1855 to 1859 was a member of the staff of the *Allgemeine Zeitung* of Augsburg, and from 1859 to 1864 editor of the liberal *Isar-Zeitung*. He published *Jungfrüdel, der Spielmann* (1854), a poem which established his reputation, and considerable fiction, including *Des Rabbi Vermächtnis* (1866), *Verhehmt* (4 vols., 1868), which was attacked for containing alleged portraits of contemporaries of the Bavarian court, and *Der Kuster von Horst* (1889).

BECKER, GEORGE FERDINAND (1847-) An American geologist, born in New York City. He graduated at Harvard in 1868 and subsequently pursued his scientific studies at Heidelberg and at Berlin. He was instructor in mining and metallurgy at the University of California from 1875 to 1879, and was associated with the United States Geological Survey from 1879 to 1892, and from 1894 to 1897. From 1879 to 1883 he was special agent of the tenth census and in 1896 made an examination of the gold and silver mines of South Africa. In 1898 he accompanied the United States army to the Philippine Islands as geologist and upon his return was appointed director of the Division of Chemical and Physical Research. The following is a partial list of his principal works: *Atomic Weight Determinations*, *A Digest of the Investigations Published since 1814* (1880), *Geology of the Comstock Lode and the Washoe District* (1882), *Statistics and Technology of the Precious Metals* (with S. F. Emmons, 1885), *Geology of the Quicksilver Deposits of the Pacific Slope* (1888), *Gold-Fields of the Southern Appalachians* (1895), *Geology of the Philippine Islands* (1901), *Experiments on Schistosity and Slaty Cleavage* (1904), *Relations between Local Magnetic Disturbances and the Genesis of Petroleum* (1909), *Age of the Earth* (1910), *Biographical Notice of Samuel Franklin Emmons* (1911), *Reports on the gold fields of South Africa and Alaska*. Becker's most important work was in connection with the origin and mode of occurrence of ore deposits, especially those of the Western States, to the knowledge of which he made extensive contributions.

BECKER, JEAN (1833-84) A German violin virtuoso. He was born at Mannheim and studied with Kettenus and Vincenz Lachner. After a short period as a conductor at Mannheim he entered upon a series of brilliant concert tours (1858) and finally settled in Florence, Italy, where in 1866 he established the famous Florentine Quartet.

BECKER, KARL (1823-96) A German statistician, born at Strohausen (Oldenburg). He

fought in the campaigns of 1848-50 against Denmark and rose to be a captain in the army of Schleswig-Holstein. In 1855 he organized the statistical bureau of Oldenburg, of which he became director, and from 1872 until his retirement in 1891 was director of the statistical office of the German Empire. He edited *Statistische Nachrichten über das Grossherzogthum Oldenburg* (1857-72) and from 1877 the *Monatshefte zur Statistik des Deutschen Reichs*. His writings include *Zur Berechnung von Sterbetafeln* (1874).

BECKER, KARL FERDINAND (1775-1849) A German philologist, born at Lieser, Prussia. He studied at the University of Göttingen, became a physician at Offenbach in 1815, and there opened a small private school. Here his work as an instructor led him to make researches in philology, which for a time met with considerable recognition. His view was that all languages are subject to certain logical and philosophical principles, and that thus a science of comparative philology might be arrived at by a process of deduction. This method was later largely discredited by the investigations of Jakob Grimm and others, whereby comparative philology is based on principles of history and ethnology and is attained inductively. Becker's works include *Deutsche Wortbildung* (1824), *Ausführliche deutsche Grammatik* (3 parts, 1836-39), and *Der deutsche Stil* (1848, 3d ed., revised by Lyon, 1884). Consult Helmsdorfer, *Becker der Grammatiker* (Frankfort, 1854).

BECKER, KARL FERDINAND (1804-77) A German writer on music, and organist. He was born in Leipzig. He was made professor of organ playing at the Conservatory in 1843, but resigned in 1856. Among his works on the history of music, which place him in the same rank with Kieselwetter and Winterfeld, the most important are *Die Hausmusik in Deutschland im 16., 17., und 18. Jahrhundert* (1840), *Die Tonkünstler des 19. Jahrhunderts* (1847). He was also among the most active contributors to the *Neue Zeitschrift für Musik*, and one of the original founders of the German *Bach Gesellschaft*.

BECKER, KARL FRIEDRICH (1777-1806) A German historian, born in Berlin. He studied at Halle and for a time was a teacher at Kottbus and Berlin. He wrote *Erzählungen aus der alten Welt für die Jugend* (3 vols., 18th ed., 1890), and a *Weltgeschichte für Kinder und Kinderlehrer* (9 vols., 1801-05), since frequently reprinted and so enlarged and revised by Wolfmann, Menzel, Loebl, and others as to leave, in spite of the gain in fullness and scientific accuracy, scant traces of its original charm of style and arrangement.

BECKER, KARL (LUDWIG FRIEDRICH) (1820-1900) A German genre and historical painter, born in Berlin. He was a pupil of Von Klover and Hess, afterward studied in Paris, Rome, and Venice, and first attained success with historical and mythological paintings. Later he showed a preference for subjects taken from the brilliant life of the Venetian Renaissance. The chief characteristics of his manner are historical fidelity, skillfulness of technique, and especially a richness of coloring, which in his later works so predominates as to make their interest merely external and decorative. Of his early works the best examples are "Benedictus Begging" (1850) and the frescoes of the Niobidensaal of the Berlin Museum. Among the large number of pictures in his later style may be mentioned

"The Doge in Council" (1864), "Charles V Visiting Titian" and "Durer in Venice" (1873), "In the Picture Gallery" (1874), "Emperor Maximilian Receiving a Venetian Embassy" (1877).

BECKER, NIKOLAUS (1809-45). A German poet, born at Bonn. He is the author of the well-known song beginning, "Sie sollen ihn nicht haben, den freien, deutschen Rhein," which, as an outburst of the popular German sentiment of the day, became widely celebrated. There are more than 100 different musical settings of it, none of which, however, has become popular. The song was answered by a number of French poets, notably Alfred de Musset ("Nous l'avons eu, votre Rhin allemand") and Lamartine ("Marseillaise de paix"). Becker's celebrated poems (Cologne, 1841) are quite mediocre.

BECKER, OSKAR (1839-68). A German political fanatic, known for his attempted assassination of King William I of Prussia. He was born at Odessa. In 1859 he entered Leipzig University and in 1861, at Baden-Baden, endeavored to kill the King by firing two shots from a pistol at a distance of three paces. The monarch suffered only a slight injury of the neck. The assassin, in a letter found upon him, stated as his motive the conviction that King William was unequal to the task of uniting Germany. He was sentenced to 20 years' imprisonment, but was pardoned by the King, and released in 1866, with the stipulation that he should leave Germany forever. He lived for a time in Chicago and subsequently in Alexandria, Egypt, where he died.

BECKER, PHILIP JOHANN (1809-86). A German radical. He was born at Frankenthal, in the Palatinate, grew up extremely democratic in his beliefs, and became a common laborer by preference. For his participation in the revolutionary movements of 1830 he suffered imprisonment. He finally turned to Switzerland, which was then the home of political outcasts from every land. There he fought under Ochsenbein, against the Catholic cantons of the Sonderbund. Upon the failure of Becker's attempt to revolutionize Baden (1848), Becker, who had organized troops for his support, returned to Switzerland and put himself at the head of an expedition of German and Swiss auxiliaries to support the cause of freedom in Rome and Sicily. Their movements being frustrated, he led his troops (1849) into the Palatinate and the Grand Duchy of Baden, where a rising had taken place, and took a prominent part in many engagements, displaying great courage and strategic skill. Becker afterward became known as a leader of the young Socialist party, an active agitator on behalf of the International Association of Workmen, and the editor of many Socialist organs. Later he became a revolutionary collectivist and an adherent of Karl-Marx.

BECKER, RUDOLPH ZACHARIAS (1759-1822). A German educator and author. He was born at Erfurt and studied theology at the University of Jena. As instructor at the Basewitz "Philanthropin" at Dessau, he founded a journal entitled *Dessauische Zeitung für die Jugend und ihre Freunde*, which he afterward continued at Gotha (1784), under the title of *Deutsche Zeitung für die Jugend*, and which in 1796 was published as the *Nationalzeitung der Deutschen*. In consequence of an article in the latter publication he was arrested by the French and imprisoned at Magdeburg for 17 months. His experiences during that period were admirably

described in the interesting narrative entitled *Beckers Leiden und Freuden in 17monatlicher französischer Gefangenschaft* (1814)—a work of genuine historical merit. One of his publications, bearing the title of *Not- und Hilfsbuchlein für Bauerleute, oder lehrreiche Freuden- und Trauergeschichte des Dorfes Miltheim* (2 vols 1787-98), became exceedingly popular.

BECKER, VALENTIN EDUARD (1814-90). A German composer. He was born at Würzburg where he became celebrated as a composer of popular male choruses (*Das Kirchlein*, etc.). He also wrote several masses and two operas, entitled *Die Bergkappen* and *Der Deserteur*.

BECKER, WILHELM ADOLF (1796-1846). A German classical scholar, born at Dresden. He studied at Leipzig and became professor of archaeology at that university in 1842. Two of his works were extremely popular: *Gallus oder Römische Scenen aus der Zeit Augusts* (1838, 3d ed by Goll, 1880-82), and *Charicles oder Bilder altgriechische Sitten* (1840, revised by Goll, 1877-78). The letterpress in each book portrays the life of which it treats in the form of a romance. Ample footnotes and excursions fortify the statements in the text. Both books were translated into English by Frederick Metcalfe, the translations have passed through many editions. Becker also began the elaborate *Handbuch der Römischen Alterthümer*, which was completed by Mauquardt and Mommsen. He wrote also *De Comicis Romanorum Fabulis* (1837), *De Romæ Veteris Murs atque Portis* (1842), *Die Römische Topographie* (1844), and *Zur Römischen Topographie* (1845).

BECKER, WILHELM GOTTLIEB (1753-1813). A German archaeologist and author, born at Oberkallenberg, Saxony, and educated at Leipzig. He became professor at the Ritterakademie, in Dresden, in 1782. In 1795 he was appointed director of the Dresden Gallery of Antiques and of the Coin Cabinet, and in 1805 he was also intrusted with the superintendence of the celebrated Green Vault. He published *Augustum, Dresdens antik Denkmäler enthaltend* (2 vols, 1805-09, 2d ed, 1832-37), with 162 engravings, *Zweihundert seltene Münzen des Mittelalters* (1813), and a large number of popular handbooks of art.

BECKERATH, BÉK'E-RAT, HERMANN VON (1801-70). A Prussian statesman. He was born at Krefeld, in Rhinish Prussia, and after acquiring a considerable fortune in banking he turned his attention to politics. He served in the Diet of his province and in the Prussian Diet of 1847 and went as a deputy to the Frankfurt Parliament of 1848, where he was an unwavering advocate of German unity and political liberty. His eloquence exercised considerable influence on this assembly. He was appointed Minister of Finance in the ministry constituted for Germany under the auspices of the Parliament, and presently was called to Berlin to construct a cabinet. He declined the task, because the King of Prussia would not give him a free hand in his scheme for the unification of Germany. When the reactionary movement set in, he resigned the posts he held under the government, but continued, as a member of the Prussian Second Chamber, a vigorous opposition to the Manteuffel Ministry, which had deserted the cause of German unity. He withdrew from politics in 1862. After the return of Manteuffel to power in 1858, Beckerath was again elected a member of the Prussian Second Chamber, but

was obliged to decline the honor on account of failing health. He devoted his later years to the affairs of Krefeld, his native town. Consult Kopstadt, *Hermann von Beckerath* (Brunswick, 1875).

BECKERS, bēk'ers, HUBERT (1806-89) A German philosopher. He was born at Munich and studied at the university there. In 1832 he was appointed professor of philosophy at the Lyceum at Dillingen and in 1847 professor of philosophy at the University of Munich. He is chiefly known as an expositor of the philosophy of Schelling. His works include *Cantica Spiritualia* (1845-47), *Ueber die Bedeutung der Schellingschen Metaphysik* (1861), *Ueber die wahre und bleibende Bedeutung der Naturphilosophie Schellings* (1866), *Aphorismen über Tod und Unsterblichkeit* (1889).

BECKET, THOMAS A (c1118-70) Archbishop of Canterbury, born in London. He was the son of a merchant and was educated at Merton Priory (Surrey), London, and Paris, and later studied canon law at Bologna and Auxerre. After earning his living for a time as a notary and clerk, he became connected with Archbishop Theobald of Canterbury, receiving two church livings and various offices. In 1155 Henry II made Becket Chancellor of England. His duties were numerous and burdensome and were vigorously discharged. His style of living was ostentatious, and when necessary he equipped troops at his own expense and commanded them in person. On May 23, 1162, he was elected Archbishop of Canterbury, through the King's influence. His private life in the past had been above reproach, and as archbishop he was noted for his zeal, devotion, and piety. He soon came into conflict with the King. In 1163 he opposed him in a matter of taxation, acting as the champion of the people. He also maintained vigorously all the prerogatives of the Church, in spite of the King's anger and hostility. Henry (1164) caused the Constitutions of Clarendon (q.v.) to be drawn up, embodying, as the King asserted, the ancient customs and laws of the country, but Becket refused to abide by them, declaring them contrary to canon law. A contest followed, in which the archbishop firmly resisted the King's authority whenever it conflicted with what he held to be the rights of the Church. Henry was determined to humble the archbishop, and under various pretexts mulcted him in large sums of money. Finally, when Becket, driven to desperation, appealed to the Pope, he was declared a traitor and compelled to flee secretly from England, Nov 2, 1164. For the next six years he remained in France. Henry confiscated Becket's property and was threatened by him with excommunication and interdict. Various attempts at reconciliation were made in vain. Finally, in 1170, after the King's son had been crowned by the Archbishop of York, in direct opposition not only to custom and law, but also to the express commands of Becket and the Pope, Henry felt obliged to make terms. Becket, anxious to return to England, was promised the restoration of all his confiscated property. He landed in England on Dec 1, 1170, and immediately the struggle between King and prelate broke out anew. Becket refused to absolve the bishops who had taken part in the coronation, because, after having disobeyed the Pope, they were unwilling to swear to obey in the future. On Dec 29, 1170, four knights went to Canterbury to demand, in the name of the

King, the absolution of the bishops. Becket refused, alleging the necessity of obedience to the Pope. The knights withdrew from the cathedral transept where they were, only to return with an armed following. Becket forbade his attendants to lock the doors, saying, "God's house must be closed against no man." There, by the altar, he was murdered, declaring, "For the name of Jesus and for the defense of the Church I am ready to embrace death." Henry was compelled to make heavy concessions and to do public penance at the martyr's tomb to avoid the ban of excommunication. The murderers, having repaired to Rome as penitents, were sent on a pilgrimage to Palestine. Feb 21, 1172, Becket was canonized by Pope Alexander III, and the anniversary of his death was set apart as the day of his festival. In 1220 his bones were raised from the grave in the crypt, where they had been hastily buried the day after his murder, and by order of King Henry III were deposited in a splendid shrine, which for three centuries continued to be the object of one of the great pilgrimages of Christendom and still lives in English literature in connection with Chaucer's *Canterbury Tales*. At the Reformation Henry VIII despoiled the shrine, erased Becket's name from the calendar, and, according to a doubtful account, caused his bones to be burned and scattered to the winds. The best collection of sources for the life of Becket is contained in Robertson and Shepard's (ed.) *Materials for the History of Archbishop Becket*, Rolls Series (London, 1875-85). These include a number of biographies by contemporaries and many letters. The best modern work is Canon Morris, *Life and Martyrdom of St Thomas Becket* (2d ed., London, 1885). Consult Hook, *Archbishops of Canterbury*, vol 11 (London, 1862); Thompson, *Thomas Becket* (London, 1889); Freeman, *Historical Essays* (1st series, London, 1871); Stubbs, *Constitutional History* (Oxford, 1895); Hutton, *St Thomas of Canterbury* (London, 1889); Abbott, *St. Thomas of Canterbury His Death and his Miracles* (1898); Ward, *Canterbury Pilgrimages* (London, 1904).

BECKFORD, WILLIAM (1760-1844) An English author, born Oct 1, 1760, he was the son of William Beckford, alderman and twice Lord Mayor of London. When he was about 11 years old, his father died, and he inherited the greater part of a very large fortune, consisting of estates in Jamaica and of Fonthill Abbey in Wiltshire. His annual revenue is said to have exceeded £100,000. Young Beckford evinced unusual intellectual precocity, for before he was 17 years old he composed a satirical essay, entitled *Biographical Memoirs of Extraordinary Painters*, a sort of parody on the usual biographies of eminent artists. In 1777 he went with a tutor to Geneva, where he remained about 18 months, and in the years succeeding he made tours through Flanders, Germany, Italy, Portugal, and Spain. In 1783 he married Lady Margaret Gordon, daughter of the fourth Earl of Aboyne, and left at once for Switzerland, where they remained until the death of Lady Margaret in 1786. He had already written *Vathek* An Arabian Tale. Of its composition, which may be assigned to 1781 or 1782, he says "It took me three days and two nights of hard labor. I never took off my clothes the whole time." This famous romance, written in French and published at Lausanne and Paris in 1787, was translated from the French MS by Samuel Henley

and published, without Beckford's consent, in London in 1786. In 1790 Beckford sat in Parliament for Hendon. In 1794 he accepted the Chiltern Hundreds and again left England. He went to Portugal, purchased an estate near Cintra, and occupied for a time that "paradise" which Byron commemorated in *Childe Harold*. Tormented by unrest, he returned to England and settled in 1796 at Fonthill, where he sought to realize the magnificence of his Oriental dreams. He erected a new building at Fonthill, the most prominent feature of which was a tower about 300 feet high. Beckford resided there till 1822, when he was compelled to dispose of the estate and house, with all its curiosities. It was bought by Colonel Farquhar for £330,000. Soon after, the great tower, which had been raised upon an insecure foundation, fell to the ground. On the sale of Fonthill, Beckford removed to Bath and immediately proceeded to erect another lofty building, the plan of which also included a tower, 100 feet high. While residing there, he did not mingle in Bath society, and the most improbable stories concerning the rich and morose genius in their neighborhood were circulated among the citizens and were believed by them. During all his life Beckford was a hard-working student with a passion for books. Some of his purchases were Imperial in their way. He bought Gibbon's library at Lausanne, to amuse himself when he happened to be in that neighborhood. He went there, read in the fierce way that he wrote, three days and two nights at a sitting, grew weary of his purchase, and handed it over to his physician, Dr. Scholl. Besides *Vathek* and his youthful essay, Beckford published two sentimental novels and sketches of his travels. Consult Garnett, *Vathek*, with a critical essay (London, 1893), and Melville, *The Life and Letters of William Beckford of Fonthill* (London, 1910).

BECKMANN, JOHANN (1739-1811). A German teacher and writer on technology and agriculture. He received instruction from Linnaeus and in 1766 was appointed professor of philosophy at Göttingen. In 1770 he became professor of agricultural economics, holding this position over 35 years. Among his works are *Grundsätze der deutschen Landwirtschaft* (1769, 6th ed., 1806), *Anleitung zur Technologie* (1776, 5th ed., 1809), *Anleitung zur Handelswissenschaft* (1789), *Beiträge zur Geschichte der Erfindungen* (5 vols., 1780-1805, Eng. trans.).

BECKWITH, JAMES CARROLL (1852-) An American portrait and genre painter. He was born at Hannibal, Mo., and studied in Chicago, New York, and (1873-78) with Carolus Duran and Yvonne in Paris. Soon after his return to New York, in 1878, he was elected to the Society of American Artists and in 1894 to the National Academy of Design. He was for 18 years professor in the Art Students' League, New York, and is a member of the National Institute of Art and Letters. He decorated one of the domes of the Manufacturers Building at the Chicago Exposition of 1893, but portraiture occupies his chief attention. Among his best-known portraits are those of General Schofield, Judge Palmer, Colonel Appleton, Mark Twain, and the Ogden and Parish families. At the St. Louis Fair (1904) he exhibited "The Nautilus" and portraits of Mrs. Beckwith and F. H. Hitch, in 1905, several portraits, including that of Richard H. Ewart, Col. Charles Henry Jones

(1906), Harold de Raasloff (1909), and "The Veil" (1912). He is represented by portraits in Yale University, Johns Hopkins, and West Point. The New York Public Library has a fine collection of his clayon and pencil drawings.

BECKX, PIÉRE, PIERRE JEAN (1795-1887). The twenty-second General of the Jesuits. He was born at Sichen, in Belgium, and became a member of the Society of Jesus in 1810 and the head of the order in 1853. Quite early his superiors recognized his rare abilities and sent him on several delicate missions. When Duke Ferdinand of Anhalt-Köthen became a convert to the Roman Catholic religion, young Beckx was appointed his confessor and officiated for some years as priest of the new church which was built at Köthen. After the death of the Duke Beckx continued at the court with the widow, the Duchess Julia, whom at a later period he accompanied to Vienna. In 1847 he became procurator for the Society in Austria. In the following year the Jesuits were driven from Austria, and Father Beckx went to Belgium, where he was nominated rector of the Jesuit College at Louvain. When the Jesuits were reestablished in Austria, he zealously supported the projects of the government, which were highly favorable to the interests of the Church. He lent his aid to the Primate of Hungary, Cardinal Szczepkowsky, who succeeded in obtaining the reinstatement of the Jesuits in that portion of the Empire and in founding the novitiate at Tynau. He was sent as a delegate to the assembly at Rome in 1853 which was to choose a successor to Father Roothaan and was elected General of the order. The prodigious success of the Jesuits since that time, especially in non-Catholic countries, is due in no slight degree to the ability and foresight of Father Beckx. Besides some minor writings and occasional discourses, he published a *Month of Mary*, which has passed through numerous editions and has been translated into many languages. He resigned his office in 1884, three years before his death.

BECKY SHARP. The significant name of the chief character in Thackeray's *Vanity Fair*. Endowed with uncommon wit, she is audacious, intriguing, and determined to rise in the world. She is incapable of love, but marries Rawdon Crawley for his position, which she is obliged to forfeit because of her scandalous relations with Lord Steyne.

BECQ DE FOUQUIÈRES See FOUQUIÈRES, BECQ DE.

BECQUE, BÉK, HENRI FRANÇOIS (1837-99). A French dramatic author. He was born in Paris, and first became known by his libretto for the opera *Sardanapale* (1867, music by Do Joncières). He was a member of the staffs of several journals, was for a time a banker, and as playwright met with varying fortunes, his *Michel Paupre* (1870) and *L'enlèvement* (1871) being failures, while his *Parisienne* (1885) achieved decided success. Consult James G. Huneker, *Iconoclasts, a Book of Dramatists* (New York, 1905).

BECQUER, BÀ-KÀR', GUSTAVO ADOLFO DOMÍNGUEZ (1836-70). A Spanish poet, born at Seville, the son of the genre painter, José Domínguez Becquer. An orphan at 10, he was brought up by his godmother, whose favor he lost by refusing to adopt a regular profession. At 18 he came, penniless, to Madrid, where he earned a precarious living by journalistic hack work and by translating foreign novels and where,

after a fruitless struggle of 15 years, he died. He left three volumes, made up of poems and prose legends. The latter, of which the best known is *Leyendas españolas*, are weird, morbid tales, strongly reminiscent of Hoffman, just as his poems are reminiscent of Heine, though lacking Heine's inimitable irony, and imbued with mysticism. His collected works (Madrid, 1885) have a biographical introduction by Correa, who also published the fifth, enlarged, edition, also in three volumes, in 1904. Mrs Humphry Ward published in *Macmillan's Magazine*, 1883, an excellent article concerning Becquer. Consult also Olmsted's Introduction to his edition of some of Becquer's *Legends, Tales, and Poems* (Ginn, 1907) for the fullest account of the poet's life. An excellent complete translation of his *Leyendas españolas* was made by Cornelia Frances Bates and published (New York, 1909) with a charming introductory study by her daughter, Katharine Lee Bates.

BEQUEREL, bek'rél', ALEXANDRE EDMOND (1820-91). A French physicist, son of Antoine Cesar Becquerel. He was born in Paris and inherited the scientific tastes and talents of his father, whom he assisted in many of his investigations. He was elected a member of the Academy of Sciences of Paris in 1863 and in 1878 succeeded his father as professor of physics in the Conservatoire des Arts et Metiers. In addition to cooperating with his father, he carried on a number of experiments in electricity and light, particularly in phosphorescence, an instrument known as the phosphoroscope having been invented by him. He is also well known for his work on the solar spectrum and the spectrum of the electric light. In addition to a large number of scientific papers published in French journals, Edmond Becquerel was the author of *La Lumiere, ses causes et ses effets* (1867), and, in cooperation with his father, of *Éléments de physique terrestre et de météorologie* and other works.

BEQUEREL, ANTOINE CÉSAR (1788-1878). The first of several generations of distinguished French physicists. He was born at Châtillon-sur-Loing, in the department of Loiret. In 1808 he entered the French army as an officer of engineers and served with distinction in Spain under Marshal Suchet. On his return to France he was appointed inspector of the Ecole Polytechnique, and after serving in that capacity and with the general staff of the army, at the Peace of 1815 retired from active service to pursue scientific studies. He became professor of physics at the Museum of Natural History in Paris in 1837. His attention was principally devoted to electricity and magnetism, and among his researches are many important discoveries. While studying the physical properties of yellow amber Becquerel had occasion to make experiments on the liberation of electricity by pressure. This led him to investigate the laws governing the production of electricity by chemical action. The result of his study was the overthrow of Volta's theory of contact and the construction by him of a constant cell. The production of a current by contact between different pieces of the same metal and the determination of the resistance of various liquids and atmospheric electricity were also investigated, and he was greatly interested in meteorology and thermo-electric apparatus. He also discovered a method of determining the internal temperature of human and animal bodies, and

in physiological investigations demonstrated that when a muscle contracts there is a development of heat. Becquerel may be considered one of the creators of electro-chemistry. His labors in this branch of science secured for him election to the Paris Academy of Sciences. After 1828 he applied electro-chemistry in the reproduction of mineral substances and in various electrolytic processes. In 1837 he was elected a member of the Royal Society of London and received the Copley medal. Among his works, in several of which he had the cooperation of his son, Alexandre Edmond, were the *Traité de l'électricité et du magnétisme* (1855), *Éléments d'électrochimie* (1843), *Traité de physique* (1842), *Éléments de physique terrestre et de météorologie* (1847), *Resumé de l'histoire de l'électricité et du magnétisme* (1858).

BEQUEREL, ANTOINE HENRI (1852-1908). A French physicist. He was the son of Alexandre Edmond Becquerel and was born in Paris. He was educated at the Ecole Polytechnique and the Ecole des Ponts et Chaussées. He became professor of physics in the Museum of Natural History in 1878 and in 1895 at the Ecole Polytechnique. He was admitted to the Institute in 1889. His researches, published chiefly in *Comptes Rendus*, have dealt mainly with such optical subjects as the rotation of polarized light by a magnetic field, phosphorescence, spectroscopic studies, and the invisible radiation from uranium, to which the name of Becquerel rays has been given. For this discovery he received the Rumford medal of the Royal Society of England. The Nobel prize for physics in 1903 was divided between M. Becquerel and M. and Mme. Curie, for their researches in radio-activity.

BEQUEREL RAYS. See BEQUEREL, ANTOINE HENRI.

BECSE, bek'sé (or Ó-Becse, Old Becse, called also Szerb-Becse, Serb Becse). A town of Hungary, in the county of Bács-Bodrog, on the right bank of the Theiss, near its junction with the Franzenskanal (which connects it with the Danube), 45 miles south of Szeged (Map Hungary, G 4). It has fisheries and flour mills and carries on an extensive trade in grain. Pop., 1900, 18,865, mostly Magyars. New, or Turkish, Becse (Uj-Becse or Torok Becse) is situated on the left bank of the Theiss, in the county of Torontál, 6 miles below Becse proper. It has trade in fruit and grain. Pop., 1900, 7725.

BECSKEREK, beč'kér-ek. Two towns in Hungary. 1. **GREAT BECSKEREK** (Hung. Nagy-Becskelek). The capital of the county of Torontál, situated on the Bega, about 45 miles west-southwest of Temesvár, with which it is connected by canal (Map Hungary, G 4). It is a busy market town, with a considerable grain and cattle trade. The cultivation of silkworms is an important industry. There are several annual fairs, and the town contains several print works, a theatre, and an old castle. Pop., 1900, 26,407, one-third of whom are Germans, about an equal number Serbs, and only about one-fourth Magyars. 2. **LITTLE BECSKEREK** (Hung. Kis-Becskelek), a town in the county of Temes, about 9 miles northwest of Temesvár. Pop., 1900, 3738, mostly German Roman Catholics.

BED (AS *bed*, *bedd*, Icel *besr*, Goth, *bad*, OHG *beti*, Ger *bett*, all from the root *bhōdh*, preserved in Lat *fidere*, to dig. Originally, an excavated spot, a dug-out place; a lair). This term originally indicated, in all Germanic languages, the litter (cf. French *lit*=bed) on

which a person slept. Then it was used to include the frame or shelf on which the bedding was placed, the bedstead.

The Ancient East In the ancient Orient there was little difference between the bed and the couch on which persons reclined during the day. In Egypt the frames were sometimes high and were reached by a stool or short steps, they were supported on curved legs ending in claw feet and were of graceful lines, with a slightly raised headboard, a mattress, and a wooden pillow, or head rest. Sometimes the mattress or bedclothes were supported by a wickerwork of palm branches. The beds of the Babylonians and Assyrians were more luxurious. Beds of ivory, gold, and fine woods were enumerated in the Amarna tablets among the objects sent from Syria to the kings of Egypt. A British Museum relief shows King Asurbampal reclining at dinner on a magnificent couch, while his queen sits in an armchair. Sometimes the bedding was placed in a recess on a raised slab, as in the palace of Sargon, at Khorsabad, without any bedstead. The prevalence of insects in the East soon led to the use of canopies, baldachins, and mosquito nettings. There was one over the bed of Holofernes in his tent. These Asiatic beds were sometimes portable, sometimes stationary. The Persians are supposed to have been the first to make up a bed not only comfortable but beautiful to see, though it is probable that they inherited their taste from the Babylonians. Their great men carried beds even on campaigns, for Herodotus mentions some abandoned by Mardonius in his sudden flight. Such beds were incrustated with gold and silver and covered with magnificent stuffs. The Jews could hardly have equaled this magnificence, still several interesting passages in the Old Testament illustrate their various uses. In receiving visitors the King bowed himself upon the bed (1 Kings 1:47), in Prov. vii:16 the bedding is described "I have decked my bed with coverings of tapestry, with carved works, with fine linen of Egypt." The Homeric poems mention the three main classes of early beds: the shake-down, the portable bed, the heavy bedstead, sometimes a fixture.

Greek Beds The *Odyssey* (xxii:190) describes the bed made for himself by Ulysses. The trunk of the olive tree around which he built and roofed his chamber was trimmed and used as one of the bedposts, the frame being made by the addition of three more feet and the connecting frame, the whole was inlaid with gold, silver, and ivory. The bedding was supported on leather straps, and on top of it were blankets to make it softer. At that time there seem to have been no stuffed mattresses. The Greek bedsteads of historic times were at first less gorgeous, being usually made of maple or boxwood, solid or veneered. But the custom of not sitting, but reclining at table on couches, led to a gradual increase in decorative beauty in the sixth century B.C. Even then the Asiatics did not think that the Greeks knew how to make a comfortable bed, and when the Persian King Artaxerxes gave a bed, with all its magnificent appurtenances, to the Athenian Ambassador Timogoras, he gave also a number of attendants skilled in preparing it. While the poor continued to use the primitive litter or the skins of animals for bed covers, the wealthy became more and more fastidious in the use of bed covering and ornament. Miletus, Corinth,

and Carthage became famous centres in the dyeing, weaving, and embroidering of bed covers, and the bedsteads and couches were inlaid or veneered with ivory, tortoise shell, and precious metals, and even provided with feet of solid silver or gold. There was a class of bedmakers at Athens.

The form of Greek bedsteads and bedding at different times is illustrated not only by numerous vase paintings, but by some marble beds found at Palatitza and Pydna, and a terra-cotta bed from Tanagra. The common elements were (1) a wood frame, (2) a vegetable trellis for springs, (3) a mattress covered with striped or figured linen, or woolen cloth, or leather, stuffed with dried reeds, or wool, or the fluffy product of the *gnaphalon*, (4) pillows, one round, and two or more square, covered with linen and filled with down or feathers, (5) bed covers of various kinds, brilliantly colored, embroidered with floral and animal patterns, some of heavy woolly cloth, some of lighter texture. The bedstead had posts sometimes square, sometimes round (turned), crowned usually by an Ionic capital and of graceful design. Sometimes they were in the form of columns, sometimes they were turned in a succession of slender necks and swelling bulbs. The frame itself was narrow, the footboard was seldom raised, but the headboard commonly projected above the bed. There appears to have been, during the fifth century, a reaction toward a more Spartan simplicity in bed and bedding—due, perhaps, to the fall of Athenian supremacy, but it did not last long, and the Alexandrian age saw an even greater Oriental luxury among the Greeks.

Roman Beds In Italy the Etruscans led in love of luxury, and their beds, as shown in the paintings and reliefs of their tombs, were of the same type as the Greek, with the added comfort of air cushions. Two funeral bedsteads, veneered in ivory, have been found in Etruscan tombs of the fourth and third centuries B.C. One is in the Papa Giulio Museum, Rome, the other in the Field Museum, Chicago. They are covered with fine carvings in relief. But it was not until the close of the Republic that the Romans laid aside their simplicity and combined all the good points of Etruscan, Greek, and Oriental beds. There were five classes of Roman beds and couches: (1) the ordinary sleeping bed, or *lectus cubicularis*; (2) the reclining-table couch, or *lectus triclinarius*; (3) the smaller lounge for rest and meditation in the daytime, the *lectulus*; (4) the high marriage bed, *lectus genialis*; and, finally, (5) the funeral bed, or *lectus funebris*, on which the deceased was exposed and carried in the funeral procession. There were bedsteads of massive bronze, beautifully decorated, as, for example, that found at Pompeii, with silver incrustations. Others were of massive silver, even of gold, while the majority were veneered with expensive woods, tortoise shell, or ivory, plates of gold or silver, or gold leaf, or else inlaid in patterns with different materials. The typical Pompeian ordinary bed is very similar to the modern wooden bedstead in its proportions and structure. Some frames were high and were reached by footstools. Not only were there usually both headboard and footboard, but also in the sleeping beds the back was often protected by a board. In all these particulars it varied from the Greek bed. The mattress rested either in girth or on a delicate diagonal trellis, and was for the

poor stuffed with straw or dried reeds, and for the rich with wool, or even feathers. The pillows were of feathers or down. The bed covers were rich in color—especially purple embroidered with gold—and made of Oriental stuffs.

Oriental Beds The Roman inheritance, lost in the West after the sixth century A.D., was continued in the Byzantine Empire, and the gorgeous couches and lounges in the Imperial palaces at Constantinople are famous. The Mohammedans inherited both the Byzantine and the Persian forms of luxury, and while not paying so much attention to the bed covers, which, on account of the warm climate, were necessarily light, developed the magnificence of the baldachins and other hangings over the beds and couches to such an extent that these woven and embroidered stuffs, damasks, velvets, etc., became the masterpieces of their class and were among the most regal presents. The Crusaders became acquainted with them and introduced them into the West. In Farther Asia beds and bedding have been and still are of great simplicity, usually in the form of simple couches or mattresses, which can be easily rolled up or carried away. In India they are called *charpoys*. The Japanese lie upon matting with wooden neck rests—a custom derived ultimately from Egypt. The Chinese use low beds, often elaborately carved.

The Middle Ages Meanwhile, in the West, bedsteads, though reduced to extreme simplicity, with the fall of Roman civilization had not entirely fallen into disuse. In the time of Charlemagne they were sometimes made of bronze tubing—like our own brass bedsteads, with bulbs at the joints and ends of the posts—with a rope netting to support the mattress and with numerous large pillows. In the crusading times of the twelfth century the beds acquired considerable richness, the frames were low and narrow, and of almost Spartan simplicity, there being no headboard or footboard, and only posts projecting slightly above the frame. These frames were, however, richly inlaid, carved, or painted, were covered with embroidered hangings and overhung with canopies. As in the Carolingian age, the bedding was arranged on a very inclined plane, so now the mattresses appear much longer than the frame, raised over the low headboard and suspended on a curve. With the advent of the Gothic age in the thirteenth century, which was the golden age of the manor life of the castles, beds increased still further in size and luxury. The marriage beds stood often not in a special bedroom, but in the main hall, where all persons could enter, and were entirely curtained about. Metal bedsteads had been entirely abandoned in favor of wood. The balustrade became wider and had an opening in the middle of the front side for entrance, the height of the headboard was increased, the mattress was laid flat, inside the frame instead of on top of it, and the number of pillows was increased.

In the fourteenth century the bedsteads decreased in size but increased in comfort, in fineness of linen sheets and richness of coverings. They were placed in bedrooms, which were now sumptuously decorated with hangings. There were often two mattresses instead of one, and they were covered with silk. Previously the sheets had been used to wrap the occupant in—as nightgowns were almost unknown—but now the sheets were larger and fell over the sides of

the bed, even to the ground, under the sumptuous covers.

Later European Beds In the fifteenth century their size became enormous, seven feet long by six feet or more wide. The rooms were so large, however, that, as heretofore, the bedsteads were headed to the wall, and sometimes there were two side by side, and four or five feet apart, covered with a single immense canopy, as in the beds of Isabelle de Bourbon. The beds of Henry II and Francis I were famous, and the kings began to hold receptions in bed. The canopies were of all sizes and shapes, and suspended from the ceiling or wall. But in the sixteenth century columns came into use to support them, and the four-poster was created. Heavier stuffs became the rage for covers and hangings—velvets, brocades, and damasks. The bedsteads were heavily carved, and the headboards were often solid to the top of the canopy. The heaviest made were the English Elizabethan beds of oak—immense structures. Considerably lighter were the oak frames of Flanders. In France and Italy the ordinary fine bed was of carved walnut. In the seventeenth century the mode in France became lighter, with great use of laces and gauzes and of figured tapestries. That century was preeminently that of beautiful beds, never equaled before or since. The inventories of Louis XIV show that this monarch had an unrivaled collection of 413 superb bedsteads of all forms—four-posters, pavilioned, duchesse, Imperial *en housse*, à *pentés*, etc. This museum of beds in the *Garde-Meuble* was the wonder of all visitors. The reign of Louis XV added only a more delicately fantastic ornamentation to this age of graceful design and varied coloring. The kings, queens, ministers, great ladies, and the high nobility commonly held early receptions in bed, there was the *petit lever* and the *grand lever*. (See *LEVEE*.) The *ruelle* was the narrow space between the wall and the head of the bed, where a person could stand concealed. This importance given to the bed insured the magnificence of every detail. The Empire beds, in mahogany, with bronze trimmings, are comparatively monotonous and heavy. The Colonial beds are a simplification of the heavier English four-poster. At present many types are used, but even the finest bedsteads made are commonplace compared with the best of the past four centuries.

Modern Beds Throughout the continent of Europe beds are of the open couch form, suitable in width for one person. They consist of a frame or bedstead, bearing one or two hair or wool mattresses, they are often provided with curtains, hanging from the ceiling. In Germany there is a common practice of placing large, flat bags of down above the other coverings of beds for the sake of warmth, and sometimes a bed of down altogether supplies the place of blankets. In Italy corn-husk mattresses are very common. Throughout America the beds are usually of the French, or open couch form. The simplest kind of bed yet invented—except, indeed, the Oriental rug spread on the floor—is one frequently to be seen in America. The bedstead consists of a folding trestle called a cot, constructed with canvas on the principle of a campstool, with a movable headboard at one end to retain the pillow. Its great advantage consists in its being easily folded up, and put away in small space. Another device for saving space is the "folding bed" proper, which is

often constructed so as to resemble when closed a bookcase or some other piece of furniture. Such beds are useful where a bedroom must serve also for a sitting room, but there are many objections, both aesthetic and sanitary. In America the English practice of providing a double bed instead of the Continental custom of furnishing a separate bed for each person prevails, although, largely for hygienic reasons, the single bed has become common. The English four-posted bed, or family bed, is a gigantic piece of furniture, having a roof or canopy supported by the four posts, which are generally of mahogany and finely turned and carved. On rods along the cornice hang curtains which can be drawn around the sides and foot. Lower wooden beds and beds of brass or iron have largely supplanted the old-fashioned four-poster and are popular on account of their cleanliness and cheapness. Consult the bibliography of FURNITURE.

BED, or STRATUM In geology, a layer or a number of layers of stratified sedimentary rock, with an approximately uniform lithological character. If shale, sandstone, and limestone succeed one another in layers, each forms an independent bed, or stratum, again, if a thick sandstone be composed of a number of layers, each of these layers, or certain groups of them, may be called "beds," or "strata." While most geologists confine the terms to layers of uniform vertical composition, there is a lack of uniformity in usage as regards the number and thickness of the layers to be included under them. For instance, "stratum" is sometimes used as above defined, while "bed" is applied to each of the constituent layers. Again, "bed" and "stratum" are used in the same sense either for a group of layers or for a single layer. The occurrence of sedimentary rocks in layers is described as "bedding" or "stratification." The cause of stratification is the intermittent supply of materials for deposition, due to such causes as varying intensity of wave action, tides, or irregular deposition from rivers. When the stratification is obscure, it would seem to indicate that the materials had been supplied with little or no intermission. The individual particles of strata or beds are laid down in such a way that they tend to oppose their broader sides to the greatest stress acting upon them, which is compounded of gravity and the stress of moving water. The result is a general arrangement of the greater diameters of the mineral particles in planes parallel to the planes of bedding or stratification. See LITHOGENESIS, STRATIFICATION.

BÉDARIEUX, bâ'da-ré-'*ô* A town in the department of Hérault, France, on the Orb River, 20 miles north of Béziers (Map France, S, H 5). It is well built and is an industrial centre, having cloth factories and tanneries, and manufacturing paper, glass, oil, hats, etc. Pop. 1801, 8065, 1911, 8186.

BEDBUG A reddish-brown, flattened, wingless, nocturnal insect (*Cimex lectularius* or *Acanthia lectularia*), peculiar to the fixed habitations of man and subsisting by sucking his blood. It represents a family Cimicidae, or Acanthidae, of heteropterous bugs (Hemiptera), which, with numerous allied forms, live upon the juices of plants and animals, and this parasitic life has caused degeneracy, until now this species has acquired a very flat body, capable of hiding in narrow cracks, and has completely lost its wings, it has

also gained the power of resisting great cold and of fasting indefinitely, so that it easily survives long intervals between tenants in a house—a fact which often accounts for an otherwise mysterious appearance of the pest. Its mouth consists of a three-parted proboscis, which can be thrust through the skin like a hollow needle and then becomes a blood pump. The parasite feeds by day in cracks and crevices of floors, walls, and furniture, frequenting beds especially, simply because there it gets its living at night. The eggs of the bedbug are minute, whitish oval objects, laid in clusters in the crevices used by the bugs for concealment, and hatch in about eight days, the young being almost transparent "nits," which grow darker in color as they increase in size, until, when full-grown, they may be a quarter of an inch long. This growth is attained by means of five molts, and if food and warmth be plenty, maturity may be attained in three months, but under adverse conditions growth may be greatly prolonged. A female may lay several packets of eggs and several broods be raised each year, indeed about 250 eggs are laid each spring in lots of 50, so that under favorable conditions (slovenly housekeeping) the multiplication is extremely rapid. These insects have been known as house pests from the earliest times, and it is believed came originally from India. Aristotle alleged that they arose spontaneously from sweat. Their spread is mainly due to their being carried from place to place in furniture, vehicles, and clothing. They do not seem to have reached England previous to the seventeenth century—not, at any rate, to a notable extent, since the word "bug," which now designates this pest primarily in British speech, is not so used in Shakespeare's writings. America received this pest from Europe, and ships have now spread it all over the world. There is a popular belief that it dwells in the woods under bark of decaying timber, and also that it infests certain other domestic animals, especially poultry. That it may sometimes prey upon other animals is possible, but entomologists believe it to be restricted to humanity, and that all similar bugs (see CORROSE) found upon bats, swallows, pigeons, and poultry are species peculiar to each of those animals and do not attack man. Certain bird lice have a deceptive resemblance, also, to the Cimicidae. Bedbugs are eaten by various predatory insects, especially cockroaches and ants.

The remedy lies in persistent and minute cleanliness. The application of the common remedies, benzine, gasolene, corrosive sublimate, kerosene, or hot water, usually suffice to rid an ordinary dwelling of these pests, but in larger buildings nothing is more effectual than thorough fumigation with sulphur or bisulphid of carbon. For immediate relief in a sleeping room, pyrethrum is most available, since it can be used while a room is occupied. Dusted between the sheets of a bed, it will protect the sleeper most effectually. Many patent remedies are advertised, but they are probably not more efficacious than those given above. Consult *Bulletin No. 4 and Circulars 46 and 47*, Division of Entomology, United States Department of Agriculture. See INSECT, PROPAGATION OF DISEASE.

BEDCHAMBER, LORDS OF THE. Officers in the British royal household, 12 in number, who wait in turn upon the sovereign's person. The salary is £1000. These offices in the reign of a queen are performed by ladies. Queen

Victoria usually had from 10 to 12 ladies, and extra ladies of the bedchamber, and 8 bedchamber women. These offices are objects of high ambition, from the access they give to the person of the sovereign, and are for the most part filled by 'the prime nobility of England.' They are usually vacated at each change of ministry. On Victoria's departure from the usual etiquette in 1839, Sir Robert Peel declined to form a ministry, and Lord Melbourne returned to office. The incident caused some excitement and is amusingly known as "The Bedchamber Plot." Consult *Armistage, Old Court Customs and Modern Court Rule* (London, 1883).

BEDDARD, FRANK EVERS (1858-). An English zoologist, born at Dudley. He studied at New College, Oxford, was naturalist to the *Challenger* Expedition Commission in 1882-84, and assistant editor in the preparation of the reports of the expedition. For a time he was examiner in zoology and comparative anatomy at the University of London and lecturer on biology at Guy's Hospital. In 1884 he was appointed prosector of the Zoological Society of London. His publications include *Animal Colonization* (1892), a *Monograph of the Oligochaeta* (1895), a *Text-Book of Zoogeography* (1895), *Structure and Classification of Birds* (1898), *Book of Whales* (1900), *Mammalia* (1902), *Earthworms and their Allies* (1912).

BEDDOES, bē'dōz, THOMAS (1760-1808). An English physician and author. He was born in Shropshire, was educated at Oxford, and studied medicine in Edinburgh and London. He was appointed lecturer on chemistry at Oxford in 1788, but his unconcealed sympathies with the French Revolution rendered his post uncomfortable, and he resigned in 1792. Retiring into the country, he then wrote his *History of Isaac Jenkins*, a moral tale, in which he laid down, in a popular style, rules of sobriety and health for the benefit of the working classes, and which soon became exceedingly popular. He established in 1798 a "pneumatic institute" at Clifton, for the treatment of disease by inhalation. It did not succeed, but is memorable as having introduced to the world Humphry Davy, who was for some time its superintendent. Beddoes settled in London in 1801, where he published his *Hygeia or Essays, Moral and Medical* (3 vols., 1802). Consult the *Life* by Dr John E. Stock (London, 1811).

BEDDOES, THOMAS LOVELL (1803-49). An English dramatist. He was born at Clifton July 20, 1803, the son of Thomas Beddoes. His mother was a sister of Maria Edgeworth, the novelist. In 1808 Dr Beddoes died, leaving his son to the guardianship of Davies Giddy, afterward Sir Davies Gilbert, president of the Royal Society. Young Beddoes was placed at the Bath Grammar School, from thence, in 1817, he removed to the Charterhouse, and in May, 1820, he entered as commoner at Pembroke College, Oxford. In 1821 he published *The Improvisators*. On this volume he looked with no favor at a later period and was accustomed to destroy stray copies wherever he could find them. In 1822 he published *The Bride's Tragedy*, a work of great promise. In 1825 he went to Gottingen to study medicine and from this time forth continued to live in Germany, with occasional visits to England. While engaged at Frankfort (1848) in dissecting, he received a slight wound, which led to blood poisoning. Under most distressing circumstances he committed suicide at

Basel, Jan 26, 1849. During his wanderings in Germany Beddoes was engaged at intervals in the composition of a drama entitled *Death's Jest-Book*. This work, together with his other manuscripts, consisting chiefly of poetry, he left to his friend, T. F. Kelsall, who published it in 1850, and in 1851 the collected poems of Beddoes, with an excellent memoir. Beddoes is chiefly known by this posthumous play, which is a tragedy conceived in the manner of Webster and Tourneville, the late Elizabethans, who dealt in the terror and pagantry of death. The blank verse is good, and scattered through the play are many songs recalling the ease and freshness of Shakespeare. Consult his *Poetical Works* (London, 1890) and *Letters* (London, 1894), both edited by Edmund Gosse.

BEDE, bēd, or BĒDA, bē'da, frequently called **THE VENERABLE** (c 673-735). The greatest name in the literature of Saxon England and probably the most distinguished scholar of his age. The exact spot of his birth is a point in dispute among antiquarians, but is commonly believed to have been in what is now the parish of Monkton, near Wearmouth, in Durham. In his seventh year he entered the neighboring monastery of St. Peter, at Wearmouth, where he was educated under the care of the Abbot Benedict Biscop and his successor, Ceolfrid. His instructor in the Scriptures was Trumbert. After studying for a time at Wearmouth Bede removed to the twin monastery of Jarrow, founded in 682, here he took deacon's orders in his nineteenth year, and was ordained priest in his thirtieth by John of Beverley, then Bishop of Hexham. In the shelter of his quiet retreat Bede devoted himself to the pursuit of literature. He studied Latin and Greek, and had at least some acquaintance with Hebrew, astronomy, and prosody. He wrote homilies, lives of saints, hymns, epigrams, works on chronology and grammar, and comments on the books of the Old and New Testaments. His own list of what he had written up to 731 is given in his *Ecclesiastical History* and contains 37 titles. His calm and gentle spirit, the humanizing character of his pursuits, and the holiness of his life present a striking contrast to the violence and slaughter which prevailed in the whole island. While laboring under disease, near the close of his life, he translated the Gospel of St. John into Anglo-Saxon and dictated his version to his pupils. He died May 26, 735, and was buried in the monastery of Jarrow, long afterward (in the middle of the eleventh century) his bones were removed to Durham. His most valuable work is the *Historia Ecclesiastica Gentis Anglorum*, in five books, to which we are indebted for much of our information on the history of England down to 731 A.D. Bede drew the materials for his work partly from Roman writers, but chiefly from native chronicles and biographies, records, and public documents, and oral and written communications from his contemporaries. There is a translation of the work into Anglo-Saxon, due to King Alfred.

In chronology the labors of Bede were important, as he introduced the Dionysian reckoning of dates in his work, *De Sæcæ Abitibus Mundi*, which served as a basis for most of the mediæval chronicles of leading events in the world's history. Among the many editions of Bede's history may be noticed: the sixth, published at Strassburg about 1500 much better

edition by Smith (Cambridge, 1722), more recent editions are those of Moberly (Oxford, 1869), Dr Giles in his edition of the whole works of Bede (12 vols, 1843-1844), with an English translation, and of Plumtree (2 vols, Oxford, 1896). There are at least 35 editions in all. Entire editions of Bede's writings have been published at Paris (1544-54), Basel (1563), and Cologne (1612 and 1688), London (1843-44), and in Migne's *Patrologia Latina* (Paris, 1844). English versions of his *Ecclesiastical History* have been published by Stapleton (1566), by Stevens (1723), by Hurst (1814), by Giles (1840), by Stevenson (1852), by Gidley (1870), by Jane (1903), by Sellar (1907), in the Everyman's Library, etc. Consult Gehle, *De Bedæ Venerabilis Vita et Scriptis* (Leyden, 1838), Browne, *The Venerable Bede* (London, 1880), Werner, *Beda der Ehrwürdige und seine Zeit* (Vienna, 1875), Bright, *Chapters of Early English Church History* (3d ed, Oxford, 1897), and the introduction to Plummer's edition of the *Historia Ecclesiastica*, *Life*, by Gurgut (1901) and Rannsey (1904).

BEDE, bēd, ADAM. The hero of a novel of the same name by George Eliot. He is a young carpenter, whose character is said to be partially drawn from that of the father of George Eliot.

BEDE, CUTHBERT. See BRADLEY, EDWARD.

BEDEAU, be dō', MARIE ALPHONSE (1804-63). A distinguished French general, born at Vertou, near Nantes. In the Belgian campaign of 1831-32 he was aid-de-camp to General Gérard. In 1836 he was sent to Algeria, as commandant of a battalion of the Foreign Legion. Here he acquired his military reputation. He took part in most of the operations by which the dominion of France was established over the natives and rose to the rank of general of brigade. In 1847 he was for a short time Governor of Algeria, but was superseded by the Duc d'Aumale. When the Revolution of February broke out, Bedeau, who was in Paris on leave of absence, was commissioned by Marshal Bugeaud to suppress the insurrection. This he found it impossible to do. By the Provisional Government he was appointed Minister of War—an office, however, which he immediately changed for the command of the city of Paris. He was elected to the Constituent Assembly and was made vice president of it, always voting with the Republican party. Along with Cavaignac, Lamoricière, and others, he was arrested on Dec. 2, 1851, and went into exile. He died in Nantes.

BEDEGUAR, bēd'g-gar (Fr. from Ar. Pers. *bādāwar*, a kind of white thorn or thistle). A large, roundish excrescence, or gall, sometimes called sweetbrier sponge, produced by the *Rhodites rosea*, a gallfly, on various species of rose. The excrescence is caused by a peculiar poisonous fluid injected by the fly into the plant tissue, externally mossy, it contains the larvæ of the insect and the juices of the plant on which they feed. It was once popularly believed to produce sleep.

BEDELL, FREDERICK (1868-) An American physicist, born in Brooklyn, N. Y. He graduated at Yale in 1890 and afterward took a scientific course at Cornell (1890-92). In 1892 he became assistant professor of physics at Cornell, and in 1904 professor of applied electricity. He made valuable investigations in alternating currents of electricity. In 1894 he became the

editor of the *Physical Review*. He wrote *Alternating Currents*, with A. C. Crehore (5th ed, 1909), *Direct and Alternating Current Manual*, with C. A. Pierce (2d ed, 1912).

BEDELL, GREGORY THURSTON (1817-92). An American clergyman, the third Protestant Episcopal Bishop of Ohio, and a member of the evangelical school of his church. He was born at Hudson, N. Y., the son of Rev. Dr. Gregory Townsend Bedell, and was educated at Bristol College, Pa., and at the Virginia Theological Seminary. He was rector of the Church of the Ascension, New York City, from 1843 to 1859, when he was chosen Assistant Bishop of Ohio. In 1873, on the death of Bishop McVaine, he became Bishop and the following year consented to the division of his diocese by the formation of the new jurisdiction of southern Ohio. He resigned in 1889. His numerous works include *The Pastor* (1880) and *Centenary of the American Episcopate* (1884).

BEDELL, WILLIAM (1571-1642). A prelate of the English church, born at Black Notley, Essex. He was educated at Emmanuel College, Cambridge, and after his ordination, in 1602, officiated as a clergyman at Bury St. Edmunds. In 1607 he accompanied Sir Henry Wotton as his chaplain to Venice. There he resided about four years, deeply engaged in study, and honored by the friendship of many distinguished men, in particular Fra Paolo Sapi, then engaged in the composition of his celebrated *History of the Council of Trent*. While residing here, he translated the English Common Prayer Book into Italian. On his return home he resumed his pastoral duties at Bury, where he lived for some time in such retirement that when his friend Diodati came to England, he inquired in vain for the admirable Bedell, whose merits were so well known in Venice, and only found him by chance. In 1616 Bedell was presented to the living of Horningsheath, a neighboring parish to Bury. His retired life and his Calvinistic theology long hindered the recognition of his merits. At length, in 1627, he was unanimously elected provost of Trinity College, Dublin, to which the fame of his learning and piety had extended. He refused to undertake the charge till positively commanded by the King. At the end of two years he was promoted to the united bishoprics of Kilmore and Ardagh, the latter of which he resigned in 1633. While in this diocese he removed his lay chancellor and took upon himself the ancient episcopal jurisdiction of hearing and deciding causes. His wisdom, firmness, and charity forced even his enemies to revere him, and when the rebellion of 1641 broke out he was the only English house in the county of Cavan that was spared. Refusing to dismiss his flock, he was imprisoned for a time and on being released ministered at a private house till his death, at Drumlor, Feb. 7, 1642. The Old Testament was translated into Irish under his direction, and, besides some other works, he translated the last two books of Fra Paolo's history. His biography was written by his son William, and this was afterward edited by T. W. Jones (London, 1872). Consult also Burnet, *Life of Bishop Bedell* (London, 1685).

BEDELS, bēd'لز, or **BEDELLS** (Ger. *Pedell*; see **BEADLE**). One of the most ancient of academic officials, an attendant on the rector and the university crier. Besides the university bedel there were bedels for the different facul-

ties, "nations," and often for the doctors of the university. In Oxford University there are at present four bedels. The senior bedel registers matriculations, gives due notice to those who are to preach before the university, attends such preachers to and from the university church, acts as private secretary to the vice chancellor, and gives his whole time to the service of the university. One of the sub-bedels constantly attends the vice chancellor. The other bedel and sub-bedel attend at university sermons, at congregations, the admission of proctors, and all state occasions. All wear a round cap and particular form of gown, and must be constantly resident in the university. At Cambridge University there are two similar officers called esquire bedels, who attend the chancellor (or in his absence the vice chancellor), preceding him with their silver wands on all occasions, and, among other duties, see that the university ceremonies are maintained and that public business is conducted in proper form.

BEDESMAN, *bedz'man*. See **BEAD**.

BEDFORD (corrupted from AS *Bēdcan fōrd*, protected ford). The county town of Bedfordshire, England, situated on both sides of the Ouse, here crossed by two bridges and navigable to the sea, about 45 miles north-northwest of London (Map England, F 4). The town, which is located in a broad expanse of rich pasture and agricultural land, is clean, well paved, and shows in its outward appearance and in the number of its municipal undertakings the progressive spirit of its citizens. It was incorporated in the reign of Henry II and now sends one member to Parliament. It has an excellent water supply, which nets it a substantial profit, and has an electric light plant. It maintains several parks and recreation grounds, public markets, and a cemetery. It is chiefly famed for its charitable and educational institutions, which are largely due to the beneficence of Sir William Harper, Lord Mayor of London in 1561, who founded a free school and endowed it with 13 acres of London land. The enormous increase in the value of the property (from £40 to £15,000 or upward a year) enables the trustees to maintain grammar, modern, and preparatory schools for boys, the same class of schools for girls, and also almshouses. The most important manufacture of Bedford is that of ironware, especially agricultural implements. A considerable traffic in agricultural products, timber, coal, and iron is maintained. Pop., 1891, 28,023, 1901, 35,144, 1911, 39,183. Bedford is of great antiquity and is mentioned in the Saxon Chronicle under the name of *Bēdicanford*, as the scene of a battle between the Britons and Saxons in 571. It suffered much from the Danes in the eleventh century. John Bunyan was born in the neighboring village of Elstow, and while a prisoner in the town jail, as a disturber of the peace, he wrote his *Pilgrim's Progress*. A bronze statue of him presented to the town by the Duke of Bedford adorns St. Peter's Green. Consult Porter, *An Historical Sketch of Bedford, England* (Boston, 1891).

BEDFORD. A picturesque village of Halifax Co., Nova Scotia, Canada, at the head of the beautiful Bedford Basin, nine miles north of Halifax, on the Intercolonial Railway (Map Nova Scotia, F 4). It is a favorite summer resort of the Haligonians.

BEDFORD. A town, and the county-seat of Missisquoi Co., Quebec, Canada, on the Canadian

Pacific Railway, 7 miles north of Lake Champlain (Map Quebec, D 5). It has manufactures of agricultural implements, edge tools, sewing machines, leather, lumber, etc. Pop., 1891, 1571, 1901, 1364, 1911, 1432. **UPPER BEDFORD**, an eastern township, has a population of 600.

BEDFORD. A city, and the county-seat of Lawrence Co., Ind., 85 miles southwest of Indianapolis, on the Chicago, Indianapolis, and Louisville, the Baltimore and Ohio Southwestern, the Bedford and Wallner, and the Terre Haute and Southeastern railroads (Map Indiana, C 4). It is noted for its extensive quarrying interests, the building stone being shipped in considerable quantity over a wide field. There are also railroad shops and roundhouses. The city owns its water works, and many of its buildings, both public and private, are fine stone structures. Pop., 1900, 6115, 1910, 8716.

BEDFORD. A borough, and the county seat of Bedford Co., Pa., 85 miles (direct) west by south of Harrisburg, on the Pennsylvania and the Huntington and Broad Top Mountain railroads (Map Pennsylvania, D 17). Bedford contains features of scenic and historic interest, notably Washington's headquarters, the old courthouse, the soldiers' monument, and the picturesquely located Bedford Springs, a popular summer resort. There are also two planing mills, a large peanut factory, a flour mill, and a handle factory. Bedford, originally called Raystown, was settled about 1751 and was laid out in 1766. For many years it was an important frontier military post and for a time in 1758 was occupied by a large force under General Bouquet, while in 1794, during the Whisky Rebellion, it was the headquarters of the troops under Gen. Henry Lee, sent against the insurgents. Bedford was incorporated in 1795, its charter of that date, still in operation, provides for a mayor, elected every four years, and a borough council. The water works are owned and operated by the municipality. Pop., 1890, 2242, 1900, 2167, 1910, 2385, 1914, 2500. Consult *History of Bedford, Somerset and Fulton Counties* (Chicago, 1884), *History of Bedford and Somerset Counties* (New York, 1906).

BEDFORD, GUNNING S. (1806-70). An American physician. He was born in Baltimore and graduated at Mount St. Mary's College in 1825. He then studied at Rutgers Medical College and in Europe. He returned in 1833 and in 1836 settled in New York, where his practice in obstetrics rapidly became extensive. With Dr. Valentine Mott he founded, in 1840, the New York University Medical College, where he occupied the chair of obstetrics until 1862. His *Diseases of Women and Children* and his *Principles and Practice of Obstetrics* were republished in England and translated into French and German.

BEDFORD, JOHN PLANTAGENET, DUKE OF (1389-1435). Regent of France, and third son of Henry IV of England. During his father's lifetime, he was Governor of Berwick-upon-Tweed and warden of the Scottish marches. In 1414, the second year of the reign of his brother, Henry V, he was created Duke of Bedford. He was commander in chief of the forces in England while Henry was carrying on the war in France. After the death of Henry V. (1422), Bedford in accordance with the dying wish of the King left the affairs of England in the hands of his brother, Gloucester, and went to France to look after the interests of the infant prince, Henry

I, his nephew. In compliance with the request of his deceased brother, he offered the regency of France to the Duke of Burgundy, who refused, he then assumed it himself, but not without insulting the Duke of Burgundy as to the best method of carrying out the Treaty of Troyes, by which Charles VI had declared Henry V next heir to the French crown. On the death of Charles VI, a few months after Henry V, Bedford had his nephew proclaimed King of France and England as Henry VI. In the wars with Charles VII which followed, Bedford displayed great generalship and defeated the French in several battles—most disastrously at Verneuil, in 1424. But, in consequence of the parsimonious way in which men and money were doled out to him from England, and the withdrawal of the forces of the Duke of Burgundy, he was unable to take full advantage of his victories. The appearance of Joan of Arc was followed by disaster to the English arms, notwithstanding her utmost energy of Bedford, and in 1435 he was mortified by the treaty of peace negotiated at Rouen between Charles VII and the Duke of Burgundy, which effectually ruined English interests in France. The death of the Regent, which took place Sept. 14, 1435, may have been occasioned by his anxiety and vexation on account of the union thus formed. Bedford, who was a patron of letters, purchased and removed to London the Royal Library of Paris, consisting of 900 volumes. Consult Stubbs, *Constitutional History*, vol. II (Oxford, 1895). In 1470 George Neville was made Duke of Bedford, later the Count of Pembroke, Jasper Tudor, who died in 1495, had this title. For the present family of Bedford, see RUSSELL, HOUSE OF.

BEDFORD CITY A town, and the county-seat of Bedford Co., Va., 25 miles southwest of Lynchburg, on the Norfolk and Western Railroad (Map Virginia, E 4). It has a picturesque location, at an elevation of nearly 1000 feet, and is the seat of Randolph-Macon Academy (Methodist Episcopal, South) and other educational institutions, and of the Elks National Home. The town lies in a productive region and has an important tobacco trade, with a number of tobacco factories, woolen and flour mills, and a pigment factory. It contains a municipally owned hydro-electric power and light plant and municipal water works. Pop., 1890, 2897; 1900, 2416; 1910, 2508.

BEDFORDSHIRE, béd'fôrd-shēr. A midland county of England, bounded northeast by Huntingdon, east by Cambridge, southeast and south by Hertford, southwest and west by Buckingham, and northwest by Northampton (Map England, C 4). Its extreme length is 31 miles, breadth, 5. Area, 466 square miles, five sixths of which is arable, meadow, and pasture lands. The principal towns are Bedford, the capital, Biggleswade, Leighton-Buzzard, Dunstable, and Luton. The inhabitants are chiefly engaged in stock raising, dairying, and agricultural pursuits. Manufactured products include agricultural implements, lace, and straw goods. Pop., 1891, 60,700; 1901, 171,250; 1911, 194,625.

BEDIVERE, béd'iv-er, Sm. A knight of the round Table, who cast King Arthur's sword, Excalibur, into the lake, and who bore the dying king to the boat in which he was carried to the Isle of Avalon.

BED'LAM (ME *Bedlem*, corrupted, in popular speech, from *Bethlem*, *Bethlehem*, shorter for

name of a hospital for lunatics, in St George's Fields, Southwark, London. It was originally founded in Bishopsgate Street Without, in 1246, by Simon Fitz-Mary, one of the sheriffs of London, as "a priory of canons with brethren and sisters." When the religious houses were suppressed by Henry VIII, this one fell into the possession of the corporation of London, which converted it into an asylum for 50 or 60 insane persons. In the year 1675 the hospital was taken down, and a new one, affording accommodation for about 150 patients, was erected in Moorfields at a cost of about £17,000. In 1814 the hospital was again pulled down, and the patients were transferred to a new hospital in St George's Fields, erected for 198 patients, but in 1838 extended so as to accommodate 166 more. The building, with its grounds, now covers an area of 14 acres, and is lacking in nothing likely to insure the comfort or promote the recovery of patients. In former times the patients were exhibited to the public, like wild beasts in cages, at so much per head, and visitors made sport of them, as told by Pepys and Boswell and shown in Hogarth's pictures. The funds of the hospital not being sufficient to meet the expenditure, partially convalescent patients, with badges affixed to their arms, and known as Tom-o'-Bedlams, or "Bedlam beggars," were turned out to wander and beg in the streets. Edgar, in Shakespeare's *Learn*, assumes the character of one of these. This practice, however, appears to have been stopped before 1675, for an advertisement in the *London Gazette* of that date, from the governors of Bedlam, cautions the public against giving alms to vagrants representing themselves as from the hospital, no permission to beg being at that time given to patients. At present the moral and physical management of the patients is so excellent that annually more than one-half of their number are returned as cured.

BEDLINGTON A town of Northumberland, England, on the Blyth, 11 miles north of Newcastle (Map England, E 1). It is an important coal centre, and much of this commodity is shipped. Most of the inhabitants are employed in collieries, glass works, and manufacturing of chains and small iron goods. Pop., 1891, 17,000; 1901, 18,750; 1911, 25,440.

BEDLINGTON A gray, rough-coated breed of terriers. See TERRIER.

BED'LOE'S ISLAND. Named from a former owner. An island comprising 13½ acres in upper New York Bay, 1½ miles southwest of the Battery, the southern extremity of Manhattan Island (Map Greater New York, C 9). It was ceded to the United States government for the purpose of harbor defense and was once occupied by Fort Wood, on the site of which now stands the Statue of Liberty presented by France to the United States. See LIBERTY, STATUE OF.

BEDMAR, ALFONSO DE LA CUEVA, MARQUIS DE (1672-1655). A Spanish politician. He was accredited Ambassador to Venice by Philip III and was accused of being the originator of an infamous plot against the Venetian Republic. With the Viceroy of Naples and Don Pedro de Toledo, Governor of Milan, he planned to seize the Venetian fleet, occupy the strong posts, fire the arsenals, and with the help of an Italian army and a Spanish fleet, plunder and destroy the city. The conspiracy was discovered, and

sent home (1619) He was made President of the Council of Flanders in 1622, and soon after Cardinal He finally came back to Spain as Bishop of Oviedo, and died in that city The authenticity of the accounts of Bedmar's plot has been disputed by later historians, and, to say the least, serious doubts have been cast on it The story of the conspiracy was treated by Otway in his *Venue Preserved* Consult Saint-Rene, *Conspiration contre Venise* (Paris, 1853), and Ranke, *Ueber die Verschwörung gegen Venedig* (Berlin, 1837)

BEDNAK-DOLA See AKMOLIN-K

BEDNUR, béd-nōō', or **BEDNORE**, béd-nōr' (Hind Bamboo City), or **NAGAR** A decayed city of Mysore, India, situated in the midst of a basin in a rugged tableland of the western Ghats, at an elevation of more than 4000 feet above the sea, in lat 13° 15' N and long 75° 6' E, 150 miles northwest of Seringapatam (Map India, C 6) It was formerly the seat of a rajah, was eight miles in circumference, and was strongly fortified In 1763 it was taken by Hyder Ali, who pillaged it of property estimated at £12,000,000, and subsequently made it the seat of his government, calling it Hydernagar (Hyder's town), of which the name "Nagar" is an abridgment It was taken by the British under General Matthews in 1783, but soon retaken by Tipoo, at the head of a superior force, when General Matthews and all the principal British officers were put to death The population, which once exceeded 100,000, had dwindled by 1901 to less than 1000

BED OF JUSTICE (Fr lit *de justice*) Literally, the seat or throne occupied by the French monarch when he was present at the deliberations of the Parlement Historically, a bed of justice signified a solemn session, in which the King was present, to overrule the decisions of the Parlement, and to enforce the acceptance of edicts or ordinances which it had previously rejected The theory of the old French Constitution was that the authority of the Parlement was derived solely from the crown, consequently, when the King, the source of authority, was present, that which was delegated ceased Acknowledging such a principle, the Parlement was logically incapable of resisting any demand that the King in a bed of justice might make, and decrees promulgated during a sitting of this kind were held to be of more authority than ordinary decisions of the Parlement Monarchs were not slow to take advantage of this power to overawe any Parlement that exhibited signs of independence The last bed of justice was held by Louis XVI at Versailles, Aug 6, 1787

BEDOS DE SELLES, be-dōs' de sél, Dom FRANÇOIS (1706-79) A French organ builder and author, born at Caux, near Béziers He was a Benedictine of the congregation of Sainte-Maur, and a correspondent of the Paris Academy of Sciences One of the most skillful organ builders of his time, he wrote an excellent treatise on *L'art du facteur d'orgues* (4 vols, folio, 1766-78, with numerous engravings) He published also *Gnomonique pratique* (1774), in exposition of the principles involved in the drawing of solar dials The former work has by some wrongly been attributed to one Jean François Monriot (died 1797), a Benedictine of Saint-Germain-des-Près

BEDOTT', Wmow The pen name of the author of the *Widow Bedott Papers*, Mrs Frances Miriam Whitaker

BEDOUIIN, béd'ōō-ēn or -in (Ar *Bedui*, *Badawi*, pl *Badwiin*, those of the desert) A typical nomadic people, still found in their purity in the deserts of central Arabia, where, in language, social life, and religion (outside of their profession of Islam), they retain much of primitive Semitism They have also wandered over northern and northeastern Africa, northward to the Caucasus, and eastward beyond the borders of Persia, the rural and semi-urban conditions of parts of all these countries modifying not a little their desert-born peculiarities Through the Berbers and Moors, with whom they have mixed, the Bedouin have had an influence upon Spain and southern France, which, in the case of the latter country, is made much of sociologically by Desmoulins in his *Les Français d'Aujourd'hui* (Paris, 1898) In these migrations much intermixture with other peoples has occurred Their independence, spirit of liberty, sense of hospitality, restlessness, etc., all find expression in a rich fund of song and story where the dreamy and exaggerative imagination of the race has full play Among the desert Arabs the Mufichara, or tribal song duel, a sort of primitive arbitration court, was developed The contrast and interrelations of desert and oasis, and the vicissitudes of migratory life, are reflected in the social and domestic institutions of the Bedouin The worst side of their character, the love for pillage and destruction, evidenced from the earliest times, has gained them an unenviable reputation the world over as robbers par excellence Nearly all the Bedouin are Mohammedans (See SEMITES) Consult Burckhardt, *Notes on Bedouins and Wahabys* (London, 1830), Blunt, *Bedouin Tribes of the Euphrates* (London, 1879), Zwemer, *Arabia, the Cradle of Islam* (1900), and the general works on Arabia, also the valuable *Encyclopædia of Islam*, now being published under the editorship of Dr Houtsma

BED'SORE' A sore on the hip, back, heel, etc., often a very troublesome complication of disease, to which a patient is liable when for a long time confined to bed and either unable or not allowed to change his position Bedsore are due to lowered nerve tone and pressure Thus they are likely to occur in cases of continued fever, or any other prolonged debilitating disorder, in paralysis, and in cases of fracture The skin, at certain projecting bony parts, chiefly about the region of the buttocks or on the heel, is apt to inflame, ulcerate, and slough, from the continued pressure, especially if the patient is not kept perfectly clean—as, for example, when the evacuations and urine escape involuntarily, or the skin is softened by excessive perspiration In a few of the cases the patient complains of a sense of discomfort at the parts, in others the sores give rise to exquisite suffering In all cases of prolonged supine position the parts naturally pressed upon by the weight of the body should be carefully examined every day When a long confinement in bed is expected, attempts should be made to thicken the cuticle and enable it to bear pressure better, by sponging with alcohol, and the patient should be put on an air bed or a water bed (qv) If the area, when first seen, looks red and rough, further damage is often prevented by covering it with a piece of zinc-oxide plaster and at once removing local pressure by air cushions specially constructed for cases of this kind If possible, the patient should be

made to alter his position frequently. Excoriations should be treated like other ulcers, with balsam of Peru, or iodoform and bismuth, or strapping with adhesive plaster.

BED-STRAW' (*Galium*). A genus of plants belonging to the family Rubiaceae, and distinguished by a small wheel-shaped calyx and a dry two-lobed fruit, each lobe containing a single seed. The leaves are whorled, and the flowers minute, but in many of the species the panicles are so large and many-flowered that they ornament the banks and other situations in which they grow. The species are very numerous, natives chiefly of the colder parts of the Northern Hemisphere, or of mountainous regions within or near the tropics. About 300 species are known, some of them very common weeds. Among these is the yellow bedstraw (*Galium verum*)—sometimes called cheese rennet, because it has the property of curdling milk and is used for that purpose—a small plant with linear deflexed leaves and dense panicles of bright yellow flowers, very abundant on dry banks. The flowering tops, boiled in alum, afford a dye of a bright yellow color, much used in Iceland, and the Highlanders of Scotland have long been accustomed to employ the roots, and especially the bark of them, for dyeing yarn red. They are said to yield a red color fully equal to that of madder, and the cultivation of the plant has been attempted in England. The roots of other species of the same genus possess similar properties, as those of *Galium trifidum*, a species abundant in low marshy grounds in Canada and the adjacent United States, and those of *Galium boreale*, another North American species used by some of the Indian tribes. Like madder, they possess the property of imparting a red color to the bones and milk of animals which feed upon them. Medicinal virtues have been ascribed to some of the species, as *Galium rigidum* and *Galium mollugo*, which have been extolled as useful in epilepsy. The roasted seeds of some, as *Galium aparine*, the troublesome goose grass or cleavers—remarkable for the hooked prickles of its stem, leaves, and fruit—have been recommended as a substitute for coffee, but it does not appear that they contain any principle analogous to caffeine. This plant is a native of the northern parts of Europe, Asia, and America. Its expressed juice is in some countries a popular remedy for cutaneous disorders. The roots of *Galium tuberosum* are farinaceous, and it is cultivated in China for food. The name "bedstraw" is supposed to be derived from the ancient employment of some of the species, the herbage of which is soft and fine, for strewing beds.

BEE (commonly explained as "the trembler," from the root *bhi*, to fear, AS *bed*, Ger *Bierre*). Any hymenopterous insect of the group Apoidea. This group (the Linnæan "genus *Apis*" and until recently regarded as the single family Apidae, or at most two families, Apidae and Andrenidae) comprises those Hymenoptera which have the hind feet dilated or thickened, the hairs of the head and thorax feathery, and the tongue adapted to lapping the nectar of flowers.

Bees stand, in organization and intelligence and in social and constructive abilities, at the head of the whole insect tribe; they abound in all parts of the world, but are most numerous in the warmer latitudes, more than 1500 species are known to science, they exert a most important influence upon the vegetable world by their

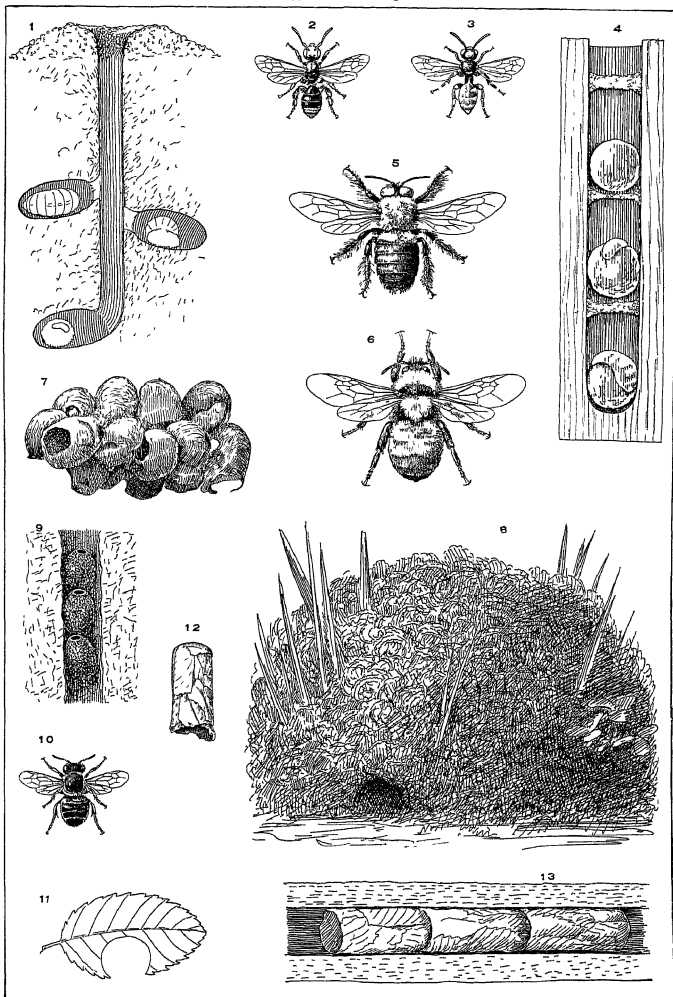
services in the cross-fertilization of plants, some of which now depend wholly upon their cooperation for their existence, and they furnish mankind with the important food honey, some species being semi-domesticated for the purpose of making it in large and manageable quantities for man's benefit.

Habits. All bees feed, when adult, on saccharine juices, particularly the nectar of flowers, but the larvae are fed by their elders on "beebread," which consists of the pollen of flowers collected by the bees and made into small masses. They begin their search with the opening of flowers in the spring, and do not cease it until the withering of the last blossoms in the fall compels the insects to desert and to go into winter quarters. There the social species have stored a supply of honey in a series of small waxen chambers or "cells," combined into "combs," upon which they subsist until spring, while the solitary species, which do not lay up such stores, mostly die, but their larvae, snugly placed in burrows, or other concealed or parasitic situations, remain quiescent until the return of warm weather, when they emerge. These remarks apply to the colder climates, in the tropics winter is not to be feared, but extensive droughts must be provided against. It is the habit of bees to devote their searching to a single sort of flower as long as it serves their purpose, each individual visiting blossom after blossom of that kind, instead of searching flowers indiscriminately, and to this habit is due the great service they accomplish in cross fertilization. See **POLLINATION**.

Feeding.—To enable them (or such, hereafter described, as do this work) to reach their liquid food in the nectaries, usually at the bottom of tube-like flowers, the bees have developed to the highest degree the prolonged mouth parts or "proboscis" characteristic of hymenopterans, and the extensible ligula or "tongue" is hairy, and terminates in a little spoon-like part, by which the nectar is brushed or lapped out of its receptacles and conveyed into the mouth. Here it is partly swallowed into a dilatation of the oesophagus, analogous to a bird's crop, and called the "crop" or "honey-bag" where it is "ripened" into honey (qv). When enough has been obtained, it is disgorged either as food for those of the community which remain at home in the nest, or to be stored in the comb cells of those species which lay up winter stores. The mouth of bees is also employed for cutting and tearing, and to this purpose their upper jaws are especially adapted. The bumblebees thus open their way into the tubes of flowers which are so deep and narrow that they cannot otherwise reach the nectar at the bottom. Others make use of their mandibles to cut out portions of leaves, or of the petals of flowers, to form or line their nests, the hive bees use them in working with wax, in feeding larvae with pollen, in cleaning out cells, in tearing to pieces old combs, in combats, and in all the great variety of purposes for which organs of prehension are required.

But it is not by means of any of the organs connected with the mouth that bees collect and carry to their nests the supplies of pollen needful for their young. The feathered hairs with which their bodies are partly clothed, and particularly those with which their legs are furnished, serve for the purpose of collecting the pollen, which adheres to them. It is brushed into a hollow on the outer surface of the first joint of the tarsus of each of the hinder pair of

WILD BEES



1 UNDERGROUND BURROWS OF ANDRANA

2 A BURROWING BEE (*Halictus flavipes*)

3 A PARASITIC BEE (*Nomada solidaginis*)

4 TUNNEL OF No 5, BORED IN WOOD, AND SHOW-

ING EGGS AND LARVÆ IN CHAMBERS

5 A CARPENTER-BEE (*Xylocopa carolina*)

6 A BUMBLEBEE (*Bombus fervidus*)

7 EGG-CELLS OF BUMBLEBEE

8 NEST OF BUMBLEBEE

9 EGG-CELLS OF A MASON-BEE (*Osmia*)

10 A LEAF-CUTTER BEE (*Megachile argentata*)

11 ROSE-LEAF CUT BY No 10

12 EGG-CELLS OF No 10

13 SAME, LAID IN A HOLLOW PLANT-STEM

legs, this joint being therefore very large, compressed, and of a square or triangular form—a conformation to which nothing similar is found in any other family of insects. This hollow receptacle is known as the corbiculum or "pollen basket", and in the social bees it is possessed only by the workers, since the perfect males (drones) and females (queens) never collect pollen.

Faculties—Bees possess a very high development of the nervous system, brain, and senses. The great compound eyes, as well as the ocelli characteristic of the higher hymenopterans, are here as highly developed as anywhere—perhaps higher—and bees depend greatly upon their eyes for information, observing carefully the situation of their home or any other place to which they may wish to return when leaving it for the first time, then rising in higher and larger circles until they catch sight of some landmark, when they strike straight towards it through the air, hence the proverbial phrase, "a bee line." Their visual sense of form and color must be well advanced also, and the bearing of this upon the development of color and form in blossoms is a matter of very curious interest and of much importance in the history of the mutual development of these insects and the plants they frequent. They are able, also, to guide their movements in the dark as accurately as in the full light of day—at least within the nest or hive, and this power is generally ascribed to the antennae, or "feelers," which are supposed to be not merely delicate organs of touch, but also organs of hearing or of smell. It is certain that the social bees communicate with each other by means of their antennae, and that they avail themselves of these organs for their ordinary operations, for recognition of each other, and for what may be called the conduct of the affairs of the hive. There can be no doubt that bees possess in a high degree the sense of smell, and their possession of the senses of taste and hearing is almost equally unquestionable, whatever difficulty there may be in determining the particular organs of the latter sense. The degree of development of these senses differs not only among the various families, but in the several forms of each species: thus a male honeybee has 13,000 facets in each eye, while the workers have only 6000, and Cheshire calculates that one antenna of a male has 37,000 olfactory cavities, while a worker's antenna has only about 2500.

Classification The latest conclusions of hymenopterists, following the lead of the late W. H. Ashmead, of the United States National Museum, are expressed in placing the bees as a superfamily Apoidea of the heterophagous Hymenoptera, and in dividing them into 14 groups ranking as families. The first two of these are "social" in their habits, forming communities in which each individual performs some duty for the common weal, namely, the true bees (Apidae) and the bumblebees (Bombidae). The remaining families are bees of "solitary" habits, each one living and working alone, even when the species is somewhat gregarious. These solitary forms are: The hairy digger bees of the family Anthophoridae, the cuckoo bees (Nomadidae), the small carpenter bees (Ceratinidae), the large carpenter bees (Xylocopidae), the mason, leaf cutter, and potter bees (Megachilidae), the parasitic Stelidae, the burrowing Andrenidae, Colletidae, Prosopidae, and others

Of these the Prosopidae are simplest and lowest, and as they are world-wide in their distribution, they are considered by evolutionists as the actual representatives of the primitive bee type, whence all have issued that are known to us to-day.

Solitary Bees—Most of the Colletidae burrow, making rather rude tunnels, or utilizing cracks in stone walls. The Andrenidae do the same. This is a very large and widespread family, numerously represented in the United States and in Europe. All are small, comparatively smooth, wasp-like, and often metallic in color. A notable genus is *Halictus*, which are among the smallest and most numerous of bees. "This genus, together with *Sphecodes*, differs from all other solitary bees in the fact that the impregnated females hibernate, . . . the males dying." The ensuing spring the surviving females dig their burrow, make and provision their cells, and oviposit." The great genus *Andrena* is also commonly represented in the United States as well as other parts of the world, and, like *Halictus*, digs burrows 6 to 10 inches deep, from which chambers branch off, the walls of which are "glazed with a mucous-like secretion." These are among the earliest of insects to appear in the spring, flying about the "pussy willows." They burrow and lay eggs in May, provision their nests with pollen about June 1, and the young appear in August in the Northern States. The Stelidae, of the Old World, are entirely parasitic in the nests of other bees, where they mature earlier than do the rightful owners and kill such of their larvae as they encounter, after consuming the food provided for the latter. The cuckoo bees (qv) of the family Nomadidae also lay their eggs and dwell in the nests of other bees, but seem to do so on perfectly good terms with their hosts.

The smooth and pretty "carpenter bees" of the family Ceratinidae are small, active, generally metallic blue, blue-black, or bright green, and fond of sunshine. "They bore tunnels into the stems of pithy plants and form their cells in these burrows. They are very commonly found in brambles. The cells are lined with a delicate silky membrane and are separated from one another by mud partitions. The common *Ceratina dupla* is a familiar example. With this bee the cells are filled with a paste of honey and pollen, upon which the larvæ feed." The great carpenter bees proper, the Xylocopidae, are, on the other hand, among the largest and most hairy of the tribe and make large burrows in solid wood (See CARPENTER BEE). The family Megachilidae is composed of a variety of highly developed bees, some of which burrow, while others make nests in wooden tunnels lined with pieces of leaves or form cells of clay. (See LEAF CUTTERS, MASON BEES, POTTER BEES). The Anthophoridae are also hairy bees of rather large size and gaudy colors that burrow in the ground. This completes the sketch of the solitary families, which agree in having only two forms—sexually perfect males and females—and in the absence of wax-making power, while their pollen-gathering implements are very poor in the lower ranks, and in the higher by no means equal to those of the two social families next to be considered.

The social bees (bumblebees and honeybees) are readily distinguished from other and plainly inferior members of the tribe by several striking peculiarities, succinctly stated by L. O. Howard as follows: "Each species is composed of three

classes of individuals—males, females, and 'neuters' or workers. They live gregariously in larger or smaller communities. They have the power of secreting wax, from which their cells are made, and the larvae are fed from time to time by the workers. The outer side of the dilated posterior tibia is smooth and in the workers is hollowed into a shining plate for carrying pollen, which is collected by means of the pollen brushes on the basal joint of the hind tarsi. The maxillary palpi are very small. As a general thing the body is covered with hair."

The lowest place in this category is occupied by the bumblebees (Bombidae), or "humblebees," as they are more frequently termed in Great Britain. These are fully described elsewhere (see BUMBLEBEE), and here it need only be said that their colonies, inhabiting nests underground, are not permanent. All the members perish on the approach of winter except the impregnated females ("queens"). These hide away singly, and each one founds a new colony early in the succeeding spring. Consequently the colonies are small, rarely exceeding 200 individuals, in American species at least, and no greater stores of honey are accumulated than suffice for the season's needs.

Social Bees—A distinct step in development, from every point of view, is the family Apidae, or honeybees, for these form permanent colonies, lasting through the winter by means of stored food, the amount of which is proportionate to and adequate for the needs of the colony, although that may and usually does number many thousands of lives, dispose of their unwieldy surplus of population by migration, and conduct a community life of extraordinary activity and usefulness by a systematic economy and a body of instincts, modified by intelligent judgment, which cannot be matched elsewhere in the animal kingdom. This activity and productive power has long been tuned to the use of man in the care of a few species which have been domesticated since prehistoric times. The different species of honeybee in a wild state generally make their nests in hollow trees or among the branches of trees, sometimes under ledges or in clefts of rocks, and their stores of honey are not only sought after by man, but afford food to numerous animals, some of which equally delight to prey upon their larvae. Several species have been made, in a limited degree, to subserve man's needs in a more regular way. The common bee of southern Asia (*Apis indica*) is kept in limited numbers, according to Benton, in earthen jars and sections of trees, simulating its natural home, in parts of the East Indies. Its cells are smaller than those of our hive bee, and under the rude methods employed only 10 or 12 pounds of honey are obtained. Another small East India bee (*Apis florea*) builds a comb about the size of one's hand in the open air, attached to a twig of a bush, and does not seem capable of domestication. *Apis dorsata* of the Far East, on the other hand, is of gigantic size, and Benton first learned its peculiarities. They build immense oval combs, often 5 or 6 feet long and 3 or 4 feet wide, which they attach to overhanging ledges of rocks or large limbs to lofty trees in the primitive forests of southeastern Asia and the neighboring islands, including the Philippines. Benton found that when these combs were placed in frame hives the bees did not desert them and were easily handled, the quantity of wax and honey was

always very large, and there seems no reason why this kind of bee should not be brought under cultivation in civilized regions. Several other species of possible importance in the future exist in other parts of the tropics, as *Apis adansonii* of West Africa, *Apis unicolor* of Madagascar and Mauritius, and the closely related stingless bees of the tropical American genus *Melipona*. Consult Bingham, *Fauna of British India: Bees and Wasps* (London, 1897).

Fossil Bees—The earliest forms of bees, as far as definitely known, lived in Tertiary times. A few specimens belonging to the order Hymenoptera have been found in Mesozoic strata, but it cannot be said with certainty that they include representatives of the group Apoidea. In the Tertiary period this group was probably fairly abundant, as a large number of fossil species have been described from Tertiary strata in Europe and America. The best-known European localities are Oensigen (Switzerland), Radoboj (Croatia), and Roth and Klotienssee (Germany), where 7 species of *Bombus*, 5 of *Anthophorites*, 1 of *Anthophora*, 2 of *Apis*, and 2 of *Osmia* have been found. In America the Tertiary lake beds of Florissant, Colo., have yielded a number of species of Apoidea bees, but the specimens generally are not sufficiently well preserved to permit of exact determination. The family Andrenidae is represented in fossil form by a few specimens from North Germany and from Florissant.

The COMMON HONEYBEE (*Apis mellifica*) This is supposed to be of Asiatic origin and was domesticated about the eastern end of the Mediterranean at the dawn of history, the bee keepers of Egypt, Syria, and Greece practicing many of the arts used with bees at present, such as moving them to new pastures from time to time, etc. It traveled into Europe with the Roman civilization, if not before, and came to America with the early colonists. Several races have been developed in the course of this long history of semi-domestication, and the best of them long ago reached the United States. Its communities seem ordinarily to number from 10,000 to 60,000 individuals. These communities are made up of three classes of bees. A single one is a fully developed female, capable, after a single fertilization, of almost unlimited production of eggs; she is the mother of the band, and is usually termed the "queen." Another consists of male bees, or "drones," which at certain seasons number from 600 to 2000. The third and most common class, counted by thousands in a flourishing community, are females whose generative organs are so undeveloped that they rarely produce eggs. They are therefore popularly but erroneously called "neuters," but are better known as "workers," since they perform all the labors of the hive.

The workers have a body about half an inch in length and about one-sixth of an inch in greatest breadth, at the upper part of the abdomen. The antennae are 12-jointed and terminate in a knob. The abdomen consists of six joints or rings, and under the scaly coverings of the four middle ones are situated the *wax pockets*, or organs for the secretion of wax. The extremity of the abdomen is provided with a sting which is straight. The basal joint of the hind tarsi is dilated to form a pollen basket, and the legs are well provided with hairs for collecting the pollen and brushing it into this receptacle.

The *males*, or *drones*, so called from the peculiar noise which they make in their flight, are much larger than the workers and thicker in proportion. The antennæ have an additional joint. The eyes are remarkably large and meet upon the crown.

The *perfect females*, or queen mothers, are considerably longer than either the workers or the males; they are also distinguished by the yellow tint of the under part of the body and differ from all the other inmates of the hive in the shortness of their wings, which, instead of reaching to the extremity of the abdomen, leave some of its rings uncovered. Neither males nor queens have wax pockets, nor have they pollen baskets. Their legs also are less hairy. The sting of the queen bee is curved. The mandibles both of the males and perfect females are notched or toothed beneath the tip, while those of the workers are not. There are two rival theories for explaining the origin of the different kinds of bees in a colony. Dzierzon maintains that fertilized queens can lay fertilized or unfertilized eggs at will, the former in queen cells, and worker cells, the latter in drone cells. Dickel contends, on the contrary, that by a variation in the food the workers can produce at will, queens, drones, or workers out of indifferent eggs or larvae.

The greater part of the life of the queen or mother bee is spent in laying eggs for the increase of the population of the hive, and this increase goes on at a rapid rate, as the queen not infrequently lays 3000 eggs in a day. The number, however, varies greatly. In cold weather it is very small, but the invariable presence of brood in different stages, in a well-stocked hive, proves that some eggs are laid even in winter. During the later spring months the number is very great, many practical apiarists considering that as many as 3000, or even 4000, are deposited daily. The community, however, is not destined to an indefinite increase, but in certain circumstances *swarming* takes place, and new colonies are founded.

The *impregnation of the queen* takes place high in the air, and usually within a few days after she has emerged from the cell. It is the only occasion of her ever leaving the hive, except that of swarming. The question has therefore been asked, why there are so many males in a bee community, but no very satisfactory answer has been given to it. The males are not known to fulfill any other purpose than that of the propagation of their species, and after the swarming season is over, the greater part of them are ruthlessly massacred by the workers, as if in dread of their consuming too much of the common store. The greater part of the workers themselves are supposed to live for from one to nine months, the duration of the life of the queen bees is rarely more than three years.

An eloquent and picturesque narrative of the nuptial flight of the queen bee has been given by Maurice Maeterlinck in his book, *The Life of the Bee*. No sooner has the union been accomplished than the male's abdomen opens, the organ detaches itself, dragging with it a mass of entrails, and the emptied body falls dead toward the earth. This extraordinary flight and its tragedy seem to be Nature's effort to secure cross fertilization, and at the same time a selection of the best available mates. To the queen mother of the hive is given a power of flight that only the strongest males can equal, nor does either of them seem much inclined to copulate

until their air tubes are distended with air and until under the excitement of extreme exertion. Hence the lofty flight is necessary, and the best one of all the males alone can overtake the fleeing queen. After impregnation, the queen returns to her hive, is cleaned and cared for by the workers, and thenceforth devotes herself to motherhood for the increase of her tribe.

Eggs and Young.—The queen bee, when about to begin to lay eggs, is the object of great attention on the part of the workers. She moves about in the hive, attended by a sort of retinue of about 10 or 15 workers, by some of which she is frequently supplied with honey. But the name of queen bee appears to have originated in a mistaken notion that something analogous to a monarchy subsists in the beehive, and imagination, being permitted a free scope, many things have been invested with a false coloring derived from this analogy.

The queen bee at first lays eggs which give birth to workers, and afterward produces eggs which become drones. With unerring instinct she places each egg in the kind of cell appropriate to it, which has been prepared beforehand by the workers, the drones' cells being larger than the workers' cells. The cells in which future queens are to be reared are very unlike all the others, but the eggs differ in no respect from those deposited in workers' cells. It is a curious circumstance that queens of which the fecundation has been prevented till they are considerably older than usual lay mainly drone eggs. It occasionally also happens that some of the worker bees lay eggs, and these invariably produce drones.

The eggs of bees are of an oblong shape and bluish-white color, about one-twelfth of an inch in length. They are hatched in about three days. The larvae are little, worm-like creatures, having no feet, and lying coiled up like a ring. They are diligently fed by the working bees until, in about five days, when large enough nearly to fill the cell, they refuse food, upon which the attendant bees seal up the cell with wax, and the larva, spinning itself a fine silken envelope or cocoon, is transformed into a pupa, and about the twenty-first day from the deposition of the egg the young bee, in its perfect state, breaks the covering and issues from the cell. It is caressed and supplied with food by the attendant bees and is believed not to try its wings until several days old. The cell from which a young bee has issued is speedily cleaned out and prepared for the reception of another egg or of honey. The fine silken envelope of the pupa, however, remains attached to the cell, of which the capacity thus becomes gradually smaller, until the cells of old combs are too small to receive eggs and can be used for honey alone—a fact of which the importance in relation to the economical management of bees is obvious. The spinneret, by means of which the larva spins the cocoon, is a small organ connected with the mouth. The food with which the larvae are supplied is a mixture of pollen, honey, and water, with the addition, possibly, of some secretion from the bread glands of the working bees, by which it is prepared. It varies a little, according to the age and kind of the larva, and the peculiarities of that given to young queens appear to be indispensable to their fitness for their future functions. Pollen is constantly found stored upon the cells of

the hive, and is called "beebread." Most people have met with such cells in honeycomb, and have observed the strikingly peculiar taste of the contents.

The combs of a beehive are parallel to each other, forming vertical strata of about an inch in thickness, and distant about half an inch from each other. The cells are therefore nearly horizontal, having a slight and somewhat variable dip towards the centre of each comb. The central comb is generally first begun, and next after it those adjoining it on each side. Circumstances frequently cause some departure from this uniform and symmetrical plan, which, however, still remains obvious. Each comb consists of two sets of cells, one on each side, and it may be mentioned as an illustration of the wonderful industry of bees, and the results of their combined labors, that a piece of comb 14 inches long by 7 inches wide, and containing about 4000 cells, has been frequently constructed in 24 hours. The greater part of the comb consists of the kind of cells fitted for breeding workers, a smaller part of it of the larger or drone cells. After the principal breeding season is over, the cells of some parts of the comb are often elongated for the reception of honey, and sometimes comb of greater thickness, or with unusually long cells, is constructed for that purpose alone, in which case the mouths of the cells are inclined upward more than is usual with the ordinary brood cells. When a cell has been completely filled with honey, its mouth is sealed or covered with wax.

The comb partition is composed of a multitude of little rhombs, or four-sided figures, with equal and parallel sides, and two obtuse and two acute angles, the obtuse angles being angles of 109° and the acute angles of 71° , agreeing with the results of mathematical analysis, applied to the difficult question of the form of the facets of a three-sided pyramid, which should terminate a six-sided prism, so as to combine the greatest economy of materials with the greatest strength. On looking at a piece of empty honeycomb, placed between the eye and the light, we readily perceive that the cells are not opposite to each other, cell to cell, but that the point of meeting of three sides of three cells, on one side, is opposite to the centre of a cell on the other side—a circumstance which is calculated greatly to increase the strength of the whole fabric. It follows also from this that the terminating pyramids of the cells on the one side do not interfere with the form of the cells on the other side, but the three rhombic facets, which terminate each cell, belong likewise to three distinct cells on the opposite side of the comb.

The only departure from perfect regularity in the form of the cells is in the transition from the smaller or workers' cells to the larger or drones' cells, which, when it takes place, is managed with great simplicity and beauty of contrivance.

Beeswax.—The material of which cells are built is chiefly wax (see BEESWAX), which is at first of a white color, but becomes brownish-yellow with age, and in very old combs almost black. Although wax exists as a vegetable product, yet beeswax is now known to be produced in the bodies of bees; and it has been found that they produce wax and build combs when supplied only with honey or saccharine substances. The bees which are about to proceed to wax making suspend themselves in clusters in the

hive, attaching themselves to each other by means of hooks with which their feet are provided, and while they remain motionless in this position, the wax appears to be formed, in small scales, which they afterward take in their mouths and curiously work up with a secretion from the mouth itself, passing the wax, in the form of a minute riband, through the mouth, first in one direction and then in the opposite one, and finally depositing it in its proper place for the foundation of the comb. The bees which elaborate and deposit the wax do not, however, always construct the cells, others aiding in this, partly by a process of excavation in the wax deposited. It is supposed by many naturalists that some of the working bees are exclusively waxworkers, some nurses, etc., but others think that there is only one class of working bees, all ready for any kind of work according to circumstances.

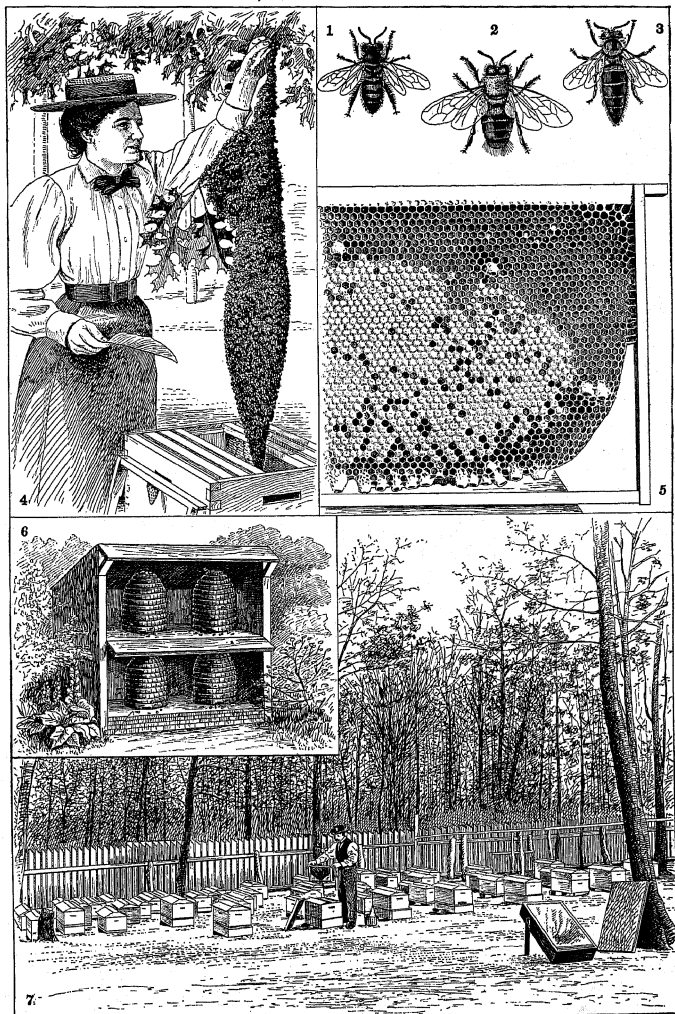
But wax, although the chief, is not the only material of the combs. *Propolis* (qv) is also employed in small bands to give greater strength to the cells, the mouths of which are surrounded with it and made thicker than their walls. This substance, which is obtained by bees from the viscid buds of trees, is also employed for more firmly attaching the combs to the hive, for closing up apertures in the hive, for covering up obnoxious substances, which are too large to be removed, and for a variety of similar purposes.

The Origin and Rearing of Queens.—Queen bees are hatched and reared in cells very different from the rest. They are vertical and not horizontal in their position—not hexagonal, but rather oval in form—and much larger than the other cells, even in proportion to the size of the animal that is to inhabit them, they are generally placed on the edge of a comb, and when they have served their purpose, are partially removed, so that during winter they resemble acorn cups in appearance.

Recently artificial queen rearing has been put on a practical basis. A number of round cells are made about the size of natural queen cells and placed on a frame in the upper part of the hive. They are then smeared with royal jelly, and ordinary larvae one to three days old are placed in the cells. The bees complete the cells and feed the growing larvae with royal jelly so that they develop into queens. Two queens cannot long exist in the same community. There is implanted in them a deadly rivalry, and the mother bee, if permitted, would even tear open every queen cell of which the inmate has nearly approached maturity, and inflict death by her sting, but workers throng around the queen, hem her in, and prevent the execution of her purpose.

Swarming.—The queen now becomes restless, her agitation communicates itself to those around her and extends through the hive, the ordinary work of the community is in great part neglected, fewer bees than usual are seen to leave or return to the hive, and at last the queen bee rushes forth, preceded and followed by crowds which press and throng upon each other, form a buzzing cloud in the air, and very generally settle upon a bush in the neighborhood, where they soon congregate closely together, hanging by their claws in a dense cluster. Sometimes they rise up in the air, and fly off at once to a considerable distance, apparently to some previously selected place in the hollow of a tree—in the chimney or roof of a house,

BEES, AND BEE CULTURE



1. WORKER, HONEY BEE.

2. DRONE, HONEY BEE.

3. QUEEN, HONEY BEE (Carniolan variety).

4. HIVING A SWARM.

5. COMB, showing worker, brood and queen cells.

6. OLD-FASHIONED BEE-HIVES.

7. A MODERN APIARY.

where they happen to find an aperture—or in some such situation. More frequently they settle not far from the hive which they have left, often on some very humble plant, or even on the grass, and soon rise again. It is the care of the keeper to prevent this by providing them immediately with a suitable habitation in a new hive, invitingly placed above them, or into which he puts the swarm after they have congregated closely together as above described. It sometimes happens that bees hurry out of their hive without their queen, in which case they do not in general congregate so closely together where they settle, and soon return to the hive again. Swarming generally takes place on a fine day, and when the bees seem on the very point of coming out, a cloud passing over the sun is enough to retard it. Bad weather occasionally not only retards but prevents it, the young queens being at last killed in their cells. A week after the first swarm of the season has left the hive with the old queen, as is usually if not always the case, the first young queen emerges, and if the bee community is a large and prosperous one, other young queens also come forth from their cells, and leave the hive with successive swarms, the number of which depends upon the climate, the season, etc. In England, it is not uncommon for a beehive to send off three swarms in a summer, the first being almost always the largest, and not infrequently itself sending off a swarm before the season is over. If a large production of honey is desired, it is customary for bee keepers to prevent more than one swarm coming from each hive during a single season. This swarming of the bees is, of course, made necessary by the over population of the hive, and is Nature's method of providing for the

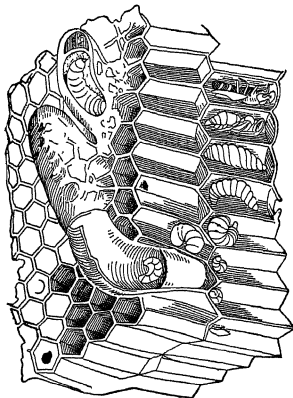
only thus could the bee communities become sufficiently scattered to enable all to find sufficient flowers to furnish food.

Bees left without a queen, and with no means of supplying the want, appear to feel themselves cut off from the very purpose of their existence, the labors of the community are slackened, and its members soon dwindle away. It has already, however, been stated that bees left without a queen can provide themselves with one by transforming and enlarging a worker's cell which contains an egg or very young larva. This process is sometimes carried on as if by several distinct parties, in different parts of the hive at once, and, as if aware that time will be gained, the bees generally prefer cells containing larvae of two or three days old to those containing eggs.

Winter Life—Bees become torpid during cold weather and consume comparatively little food. They are readily aroused from this state, however, as may at any time be proved by tapping on a beehive, when it will be found that the temperature of the interior of the hive rises rapidly. Respiration is considerably lessened in the state of torpidity, and the temperature rises when it is resumed. The respiration of bees takes place by air tubes or *tracheæ* (see INSECTS), and is very active when the insect is in a state of activity. The respiratory movements are easily seen in looking at a bee. The consumption of oxygen by this process might be expected soon to reduce the atmosphere within a hive to a state in which it could no longer support animal life, but in summer, when respiration is active and the hive populous, a constant circulation of air is maintained by the insects themselves, some of which are employed in a rapid vibration of their wings for this purpose. A greater or smaller number of them, according to circumstances, may frequently be seen thus engaged in fanning the air at the mouth of a beehive.

Enemies—Among the enemies of bees, mention should be made of the wax or bee moths which, notwithstanding the danger of the stings of the bees, enter the hives and deposit their eggs. They belong to the small subfamily *Galleriinae*, with only six species in the United States. The large wax moth, *Galleria mellonella*, a well-known pest, is a purplish-brown and yellow moth, which creeps into the hive at night to deposit her eggs. The larvae hide by day and feed by night on the wax, burrowing through the cells and doing much damage, even to the extent of destroying the colony. The bee colony should be kept strong, the cracks in the hive should be well filled to keep out the moth, and all moths and larvae seen should be killed. The lesser wax moth *Achroia grisella* is less widely distributed and does not cause as much injury. Ants often become a serious pest. Mice sometimes eat their way into the hives in winter and destroy and plunder unmolested. The bee louse (*Brasilia caca*) is a troublesome parasite of bee colonies in the Mediterranean region, being most frequently found on the thoraces of queen bees. Several species of robber flies and dragon flies occasionally capture bees and eat them. There are also a number of bee-killing birds in Europe and the United States.

Diseases—The greatest drawback to apiculture is that of disease among bees, both of the adults and of the larvae or brood. The diseases of the brood, which are the more generally dis-



HONEYCOMB

Showing two great queen cells, and worker cells containing an egg, larva, and pupæ in various stages

increase and proper dissemination of the species, by the establishment of new colonies. That the swarms should, in a wild state, seek new homes at a considerable distance is necessary, because

tributed and serious, are known as European foul brood, often referred to as "black brood," caused by *Bacillus pluton*, American foul brood caused by *Bacillus larvae*, and sac brood caused by a filterable or ultra-microscopic virus. It has been conservatively estimated that the loss from diseases of the brood in the United States alone reaches \$1,000,000 annually. The two forms of foul brood are widely distributed, occurring both in Europe and America. Both weaken colonies by reducing the number of emerging bees needed to replace the old adult bees which die from natural or other causes. The general appearance of the larvae affected with foul brood is similar in the two forms, the differences being found in the age of the larvae affected, in their response to treatment, and in the appearance and ropiness of the dead larvae. Much the same treatment is necessary to effect a cure. In appearance the brood in a diseased comb is irregular and scattered and unlike the compact masses of cells in healthy broods which contain larvae of the same age. The diseased larvae are pale yellow and unlike the pearly white healthy brood, later they turn brown, appear flabby, and are not so much curled up on a cell bottom as are the normal larvae of the same size. When the larvae do not die until the cells have been capped over, as is usually the case with American foul brood, cells are found here and there which are darker in color than the healthy ones. When these cells are opened, a brown mass is found which if drawn out is stringy and ropy, this ropiness is the surest practical indication of the presence of American foul brood.

When hives have been infected sufficiently long to show marked decline in the number of bees, the disease is likely to spread rapidly, as the remaining bees are usually inactive, and do not defend their hives against robber bees from strong healthy colonies, which in turn fall victims to foul brood. Both forms of foul brood spread from colony to colony and from apiary to apiary in much the same way. The common manner of conveying the virus is in honey which has become contaminated. The only reliable method of relieving the condition without destroying the entire diseased colony is to remove the bees from their infected surroundings to a new hive. This, commonly known as the shaking treatment, consists in the removal of all infected material from the colony and in compelling the colony to take a fresh start by building new combs and gathering fresh stores. It is done by shaking the bees from the old combs into a clean hive on clean frames.

Sac brood, often spoken of as "pickled brood," is a disease somewhat resembling foul brood, but without the characteristic ropiness. The larvae can be removed from the cell without rupturing their body wall and when thus removed have the appearance of a small closed sac. When badly infected, the colony becomes appreciably weakened by this disease. The treatment is the same as for foul brood.

The diseases of adult bees which are of less importance and less imperfectly known are so-called paralysis, the cause of which is unknown, non-infectious and infectious dysentery, the latter, also known as the Isle of Wight Disease, being caused by the protozoan *Nosema apis*, and by spring dwindling. In England the Isle of Wight disease has seriously threatened the industry.

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BEE, BARNARD E (1824-61) A Confederate general, born in South Carolina. He graduated in 1845 at West Point and served with great ability and gallantry in the Mexican War. He was on frontier duty from 1848 to 1861, became a brigadier general in the Confederate army, and was mortally wounded while leading his brigade at Bull Run, July 21, 1861.

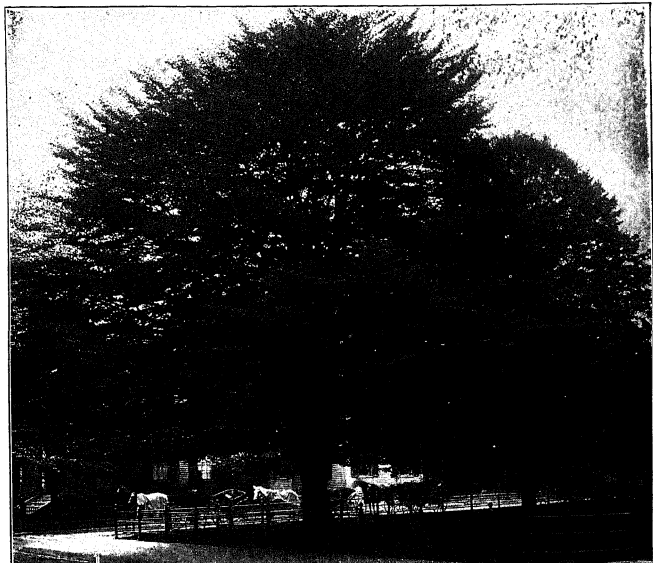
BEE, HAMILTON PROBLEAU (1822-97) A Confederate general, brother of Barnard E Bee, born in Charleston, S C. He was secretary on the commission which ran the boundary line between Texas and the United States from the mouth of the Sabine River to Red River (1839), acting as a representative of Texas. President Houston, of Texas, sent him as a commissioner to treat with the Comanche Indians in March, 1843, and although he and his associates were at first made prisoners, the mission was finally successful. When the hostilities with Mexico began, he resigned his office of secretary of the Texas Senate, and joined Gen Ben McCulloch's cavalry. He became a brigadier general of the Provisional army of Texas in 1861 and in the Confederate army in 1862.

BEE, THE A weekly magazine, first published by Mr Walkie, a London bookseller, on Oct 16, 1759. It ran through only eight numbers, but is notable from Goldsmith's contributions.

BEE BALM, balm. See OSWEGOO TEA.

BEEBE, CHARLES WILLIAM (1877-) An American ornithologist and explorer, born in Brooklyn, N Y, and educated at Columbia University. Having been appointed in 1899 curator of ornithology of the New York Zoological Society, he originated the collection of living birds in the New York Zoological Park and brought it up to first place, with a census of 900 species and 3000 specimens. In addition, he headed scientific expeditions to Nova Scotia, Florida, Mexico, Venezuela, British Guiana, the Himalayas, Borneo, China, and Japan. His most important trip, under the auspices of the Zoological Society, was undertaken in search of data for a monograph of the pheasants, a work costing over \$100,000. His publications include *Notes on the Psychology of Birds* (1903); *Two Bird-Lovers in Mexico* (1905), *The Bird*

BEECH AND BOXWOOD



2

1. BEECH (*Fagus sylvatica*)

2. BOX (*Buxus sempervirens*).

(1906), *The Log of the Sun* (1906), *Geographic Variation in Birds with Reference to Humidity* (1907), *Ecology of the Adult Hoatzin* (1909), *An Ornithological Reconnaissance of Northeastern Venezuela* (1909), *Our Search for a Wilderness* (1910), *Racket Formation in the Tail Feathers of the Motmot* (1910), *Notes Preliminary to a Monograph of the Phasianidae* (1913) Mr Beebe is one of the contributors to the 1914 edition of the NEW INTERNATIONAL ENCYCLOPEDIA.

BEE BIRD, or **BEE MARTIN**. The North American kingbird. In reference to its habit of catching honeybees, see KINGBIRD.

BEECH (OHG *buocha*, Lat *fagus*, Gk *φῆγος*, *phégos*, oak, cf Skt *bhāsh*, to eat), *Fagus*. A genus of trees of the family Fagaceae. The species are not numerous, most of them are forest trees of great beauty. The genus has been divided into two sections—*Eufagus*, with six species in the Northern Hemisphere, and *Nothofagus* in the Southern, mostly in the Andean region of South America, with a dozen species. By some botanists these are considered distinct genera. The European beech (*Fagus sylvatica*)

—see Plate of BALSAM—forms pure forests in many parts of Europe. It grows to a height of 100 to 120 feet and a diameter of 4 feet, and when standing alone becomes a very ornamental tree, with far-spreading branches, which often droop gracefully almost to the ground. It has thin, ovate, obscurely toothed leaves, finely ciliated on their margins. Its bark is smooth and is often of a whitish color. The beech thrives best in light but not sandy soils and does not send its roots deep into the ground, but rather horizontally under the surface. The wood is more or less of a reddish-brown color. It is very hard and solid but brittle, and when exposed to the open air very liable to rot and to be eaten by worms. When kept under water, it is very durable, hence its use in the erection of mills and for weirs, sluices, etc. It is also employed for many purposes by cabinetmakers and turners. It is very much used in France for making the *sabots*, or wooden shoes, worn by the peasantry, being preferred for this purpose to every other wood except walnut, on account of its incapacity for absorbing water. It is one of the best kinds of firewood in Europe. The bark is sometimes employed in tanning when oak bark is scarce. The beech bears lopping well and is often planted for hedges. Beechnuts, when fresh, have a sweet taste, like that of a walnut. They contain in large quantity a bland fixed oil, along with starch, a little sugar, and an astringent substance. A volatile, narcotic, poisonous principle, called *fagine*, is also found in them, but more in the husk than in the kernel, and when not only the smooth, leathery, outer husk, but also the thin brown inner pellicle has been removed, they constitute a wholesome food. They are, however, more generally used for feeding swine, poultry, etc., and are much employed in France and other parts of Europe for the manufacture of beech oil. When expressed without the application of heat and well clarified, this oil has an agreeable taste and is used for food, it keeps long without becoming rancid. Beech forests anciently abounded in England, and great herds of swine were fed in them. The beech is not, in general, found in Europe north of lat 59°, although it occurs 2° farther north in the Scandinavian Peninsula and in the temperate parts of Asia.

In gardens and pleasure grounds a variety is very frequently to be seen, the leaves of which have a blood-red color. The same color appears also in some degree in the leaves of the beech of North America (*Fagus ferruginea*, or *Fagus americana* as written by some botanists), which is distinguished by ovate, coarsely serrated and much acuminate leaves. It forms extensive forests in the northeastern United States and the adjoining British possessions, and its wood which is of a somewhat red or rusty color, is more valued than that of the white beech. Several species of beech are natives of the more elevated parts of the south of New Zealand, others belong to the south of South America. *Fagus*, or *Nothofagus*, is, in fact, more characteristic of the colder latitudes of the Southern than of the Northern Hemisphere. *Fagus*, or *Nothofagus*, *cunninghamii* is the "myrtle tree of the mountains of Tasmania—a very large tree with evergreen leathery leaves, in form much resembling those of the birch. *Fagus betuloides* is the evergreen beech of Tierra del Fuego, where it forms forests of which the dark-green foliage contrasts strikingly in winter with the dazzling snow. The wood is too heavy and brittle for masts, but makes tolerable planks, and is carried to the treeless Falkland Islands for roofing houses. *Fagus antarctica* ascends higher on the mountains about the Strait of Magellan. It has deciduous leaves and much resembles the common beech. *Fagus procera* grows in the Andes of Chile and attains a majestic size. It is a valuable timber tree. In the United States *Carpinus caroliniana*, a small tree, is called blue beech and water beech. A number of species of trees are called beech in Australia from the resemblance of their timber to the European beech.

BEECH DROPS. See CANCER ROOT.

BEECHER, CATHERINE ESTHER (1800-78). An American philanthropist and writer. She was born at East Hampton, L I, the daughter of Lyman Beecher, and the sister of Henry Ward Beecher and of Harriet Beecher Stowe. At the age of 19 years she was betrothed to Professor Fisher, of Yale, who shortly after lost his life at sea. She never married, but dedicated herself to the advancement of woman's education, opened a school at Hartford in 1822, and in 1832 one for young women in Cincinnati. Though she gave this up in 1834 on account of ill health, she continued to organize societies and schools for training women to social service, and to this end published numerous books, among which were *True Remedy for the Wrongs of Women* (1851), *Letters to the People on Health and Happiness* (1855), *Common Sense Applied to Religion* (1857), and *Religious Training of Children in the School, the Family, and the Church* (1864). She was a brilliant but rather eccentric woman.

BEECHER, CHARLES (1815-1900). An American Congregational divine. He was born at Litchfield, Conn., the fourth son of Lyman Beecher, was fitted for college at the Boston Latin School and at Lawrence Academy, Groton and graduated at Bowdoin in 1834. He studied theology at Lane Seminary and officiated as pastor of the Second Presbyterian Church, Fort Wayne, Ind., from 1844 to 1851, of the First Congregational Church, Newark, N J, from 1851 to 1854, of the Congregational Church, Georgetown, Mass., in 1857. From 1870 to 1877 he resided in Florida and was for two years

superintendent of public instruction. In 1885 he became state supply at Wysox, Pa., and died at Haverhill, Mass., April 21, 1900. He aided Henry Ward Beecher in the compilation of *The Plymouth Collection*, and Mrs Stowe in *Sunny Memories of Foreign Lands*, and published, among other books, *The Incarnation* (1849), *Pen Pictures of the Bible* (1855), *Spiritual Manifestations* (1879), *Eden Tableaux* (1880), and edited his father's autobiography and correspondence (2 vols, 1863).

BEECHER, CHARLES EMERSON (1856-1904). An American paleontologist, born at Dunkirk, N. Y. He graduated at the University of Michigan in 1878 and obtained the degree of Ph.D. from Yale in 1889. His early work in paleontology was done under the direction of Prof. James Hall, at Albany, N. Y. In 1888 he received an appointment at Yale University, was made professor of historical geology in 1892, and after the death of Professor Marsh he became the curator of the geological collections and professor of paleontology. Beecher's most important contributions have been to the knowledge of the development and structure of the trilobites and brachiopods. Several papers on the ontogeny and phylogeny of these and other classes of animals were collected in one volume entitled *Studies in Evolution* (1901, reissued, 1913), and appeared as one of the Yale Bicentennial publications. He also published "Brachiospongiae. A Memoir on a Group of Silurian Sponges" (*Memoirs of the Peabody Museum of Yale University*, vol. 11, part 1, 1899). He became a member of the National Academy of Sciences in 1890. Consult "Biographical Memoir of Charles Emerson Beecher" in *National Academy of Sciences, Biographical Memoirs*, vol. vi (1899).

BEECHER, EDWARD (1803-95). An American Congregational divine, born at East Hampton, L. I., the second son of Lyman Beecher. He graduated at Yale, 1822, and in theology at Andover, was pastor of Park Street Congregational Church, Boston, from 1826 to 1830, president of Illinois College from 1830 to 1844. He officiated as pastor of the Salem Street Church, Boston, from 1846 to 1856, and of the Congregational Church at Galesburg, Ill., from 1856 to 1872, then removed to Brooklyn, N. Y., where he engaged in literary and missionary work, and was pastor of the Parkville Congregational Church from 1885 to 1889. He was for six years senior editor of *The Congregationalist* and was for several years on the editorial staff of *The Christian Union*. Dr. Beecher wrote much on the theme that man is in a progressive state, the present being the outcome of a former life and a preparation for a future one to succeed after death, that the struggle between good and evil will not end with this life, but in some future era all conflicts will be ended, evil will disappear, and harmony become established. These views are set forth in *The Conflict of Ages* (1855) and *The Concord of Ages* (1860). He also published *Baptism: Its Import and Mode* (New York, 1850), *The Papal Conspiracy Exposed* (New York, 1855, Edinburgh, 1856); *History of Opinions on the Scriptural Doctrine of Retribution* (New York, 1878). He died in Brooklyn, July 20, 1895.

BEECHER, HENRY WARD (1813-87). A Protestant pulpit orator, born in Litchfield, Conn., June 24, 1813. He was the eighth child and third son of Lyman Beecher. From his

father he inherited a virile nature, a Puritan conscience, indomitable courage, and great force of character, from his mother, Roxanna Foote, of Cavalier ancestry and Episcopalian training, susceptibility to culture, love of music and art, a mystical disposition, and an almost feminine tenderness of nature. He entered Amherst College at 17, attained only moderate standing in college studies, but threw himself with enthusiasm into the study of English literature, phrenology, and elocution, and was active outside the college in prayer meetings, lectures, and lay preaching. In Lane Theological Seminary he pursued the same enthusiastic but somewhat fitful methods of study and alternated between a missionary enthusiasm and great spiritual depression accompanied with skepticism. His doubts were finally settled by a spiritual experience of Jesus Christ as the revelation of a God of infinite love and pity, which became the foundation both of his theological thought and his Christian life. On graduation he accepted the pastorate of a Presbyterian church of 20 members at Lawrenceburg, Ind., on the Ohio River, where he served both as sexton and preacher. He was thence called after two years to a New School Presbyterian church in Indianapolis, where his engaging personality, vivid imagination, and dramatic oratory brought him overflowing congregations. Eight years later he was called to the newly organized Congregational "Plymouth Church," in Brooklyn, N. Y. Here he preached for nearly 40 years to congregations of between 2000 and 3000. During a large part of his ministry one sermon each week and his Friday evening "Lecture Room Talks" were reported and published in full. Congregational singing was a feature of the public service, and the "Plymouth Collection," edited by Mr. Beecher in 1855, though since superseded by better hymnals, was the pioneer of them all. Several notable revivals of religion took place, and the church grew in membership to between 3000 and 4000, with two connected chapels or missions. Mr. Beecher also took an active part in the antislavery campaign, readily coöperating with the extreme Abolitionists, though he himself always advocated non-interference with slavery in the States and its gradual extinction under the Constitution by prohibiting its extension. He was also heard from the platform on every public question and was in great request as a Lyceum lecturer. The most notable of his addresses outside the pulpit were five orations delivered by him in England in 1863, where he successfully faced and eventually controlled more than one mob, and where he exerted a great influence in transferring the public sympathies of England from the southern to the northern side in the American Civil War. At the close of that war he advocated a policy of trust in the South and limited suffrage for the negroes with generous provision for their education and by so doing separated himself politically from the Republican party leaders. He was an early student of Spencer, Tyndall, Darwin, and Huxley, though not their follower, and accepted the doctrine of evolution on its first appearance, believing and teaching that it confirmed a rational Christianity. He accepted the Higher Criticism and applied it to the interpretation of the Bible. By instinct and temperament always an advocate of minimum governmental interference, he threw himself enthusiastically into the campaign for the election of Mr. Cleve

land in 1884 on the platform of tariff for revenue only. He retained his pulpit power to the last and died after a brief illness of apoplexy on the 8th of March, 1887.

When the *Independent* was established, Mr Beecher became first a regular contributor, then an editorial writer, then editor in chief. He soon resigned this position, his friend, Theodore Tilton, taking his place. The paper continued to publish his sermons until his break with the Radical leaders on the reconstruction problem, when their publication was suspended. In 1870 *The Christian Union* was established, with Mr Beecher as editor in chief. This was shortly followed by an attack by Mr Tilton upon Mr Beecher, ending in a suit against him for adultery. The trial, which lasted for six months, ended in a disagreement of the jury, 9 of the 12 voting in Mr Beecher's favor. Other investigations were more decisive. The largest and most representative council of the Congregational churches ever known in the history of the denomination declared unanimously their undiminished confidence in him, and at a public meeting tendered to him on the occasion of his seventieth birthday by the citizens of Brooklyn, without respect to church or party, eight years after the trial, and presided over by the justice who had presided at the trial, the public confidence of the community in him was expressed in the strongest terms.

In his later ministry Mr Beecher habitually spoke extemporaneously. He was as dramatic in private conversation as on the platform, and his imagination was as fertile. Surpassed in charm of manner and grace of diction by many orators, in combination of charm and power he was surpassed by few or none. The fervid passion of his oratory swayed his audience at the time, his marshaling of facts and his appeal to the reason rendered the impression permanent, while a mystical imagination often opened to the hearer a vision of a world invisible. He married (1837) Eunice White Bullard born in West Sutton, Mass., Aug. 26, 1812. His widow, three sons, and one daughter survived him.

Consult *Biography of Henry Ward Beecher*, by his sons, William C. Beecher and Samuel Scoville, assisted by Mrs. Beecher (1888); *Life of Henry Ward Beecher*, by J. H. Barrows (1893); *Henry Ward Beecher*, by Lyman Abbott (1903); and *Henry Ward Beecher: A Study of his Life and Influence*, by Newell Dwight Hillis (1913). Of his published works all are reprints of sermons, addresses, or occasional periodical articles with two exceptions. *Norwood*, a tale of New England life, and *The Life of Christ: Prayers from Plymouth Pulpit* (1867) interpret his devotional spirit, *Yale Lectures on Preaching* (1872-74) gives both his philosophy of preaching and his pulpit and pastoral methods, *Evolution and Religion* (1885-86) affords the best interpretation of his theological views.

BEECHER, LYMAN (1775-1863). An American theologian. He was born in New Haven, Conn., Oct. 12, 1775, died in Brooklyn, N. Y., Jan. 10, 1863, descended from one of the New Haven Colony of 1638. He lost his mother when an infant and was adopted by an uncle, Lot Benton, graduated from Yale in 1797, and next year became pastor of the Presbyterian Church at East Hampton, L. I., where his wife, Roxanna Foote, increased their slender means by teaching a private school. Mr Beecher's sermon on the death of Alexander Hamilton (killed in

a duel with Aaron Burr in 1804) gave him immediate fame, which rapidly increased until he was recognized as one of the foremost preachers in the country. In 1810 he went to Litchfield, Conn., where he was pastor of the Congregational Church 16 years. In 1814 he delivered and printed a series of six sermons against intemperance, which added greatly to his reputation for eloquence and power. He was also foremost in the Unitarian controversy which pervaded eastern New England. In 1826 he became pastor of the Hanover Street Congregational Church, Boston. In 1832 he became president of Lane Theological Seminary, a new institution near Cincinnati, Ohio, and held the office for 20 years during the first 10 of which he was pastor of the Second Presbyterian Church in Cincinnati. In 1835 he was tried by his Presbytery for teaching false doctrines, but was acquitted then, and again on appeal to the Synod. When the Presbyterian church divided, he went with the New School branch (1838). In 1852 he returned to Boston, intending to revise and publish his writings, but his mental powers failed, and not very long afterward he retired from public work, removing to Brooklyn, where he lived with his son, Henry Ward Beecher. He was married three times and had 13 children. All his sons, seven in number, became clergymen. Dr Beecher's sermons and speeches, though usually delivered extemporaneously, were the result of careful study and were marked by boldness, convincing argument, shrewd common sense, and irresistible wit. Consult his *Collected Works* (3 vols., Boston, 1852), *Autobiography and Correspondence*, edited by his son, Charles Beecher (New York, 1863), also James C. White, *Personal Reminiscences of Lyman Beecher* (New York, 1882), E. F. Hayward, *Lyman Beecher* (Boston, 1904).

BEECHER, THOMAS KINNICUT (1824-1900). An American Congregational clergyman, born at Litchfield, Conn. He graduated at Illinois College, 1843, and from 1854 until his death was pastor of a church in Elmira, N. Y., where he died. The son of Lyman Beecher, he shared the family genius and was noted for eccentricity and practical philanthropy. His publications embrace *Our Seven Churches* (1870), in which is a series of observations upon seven denominations in Elmira, and a posthumous work, *In Tune With the Stars*, stories for children, edited by Clara J. Farson (1902).

BEECHER, WILLIS JUDSON (1838-1912). An American educator and author, born in Hampden, Ohio. He graduated at Hamilton College in 1858, studied at the Auburn Theological Seminary, and in 1865 was appointed professor of moral science and belles-lettres at Knox College. From 1871 to 1908 he was professor of the Hebrew language and literature in Auburn Theological Seminary. He contributed frequently to periodicals and published *Farmer Tompkins and his Bibles* (1874), *Prophecy and the Promise* (1905), *The Dated Events of the Old Testament* (1907), *The Teaching of Jesus Concerning the Future Life* (1908), *Reasonable Biblical Criticism* (1911).

BEECHER STOWE, HARRIET E. See STOWE, HARRIET E.

BEECHY, bē'chī, FREDERICK WILLIAM (1796-1856). An English rear admiral and geographer, son of Sir William Beechey. He entered the navy in 1806, in 1814 was appointed to the *Tonnant*, and in 1815 participated in

the battle of New Orleans. In 1818 he accompanied, in the *Trent*, the Arctic expedition under Franklin, and in 1819 served on the *Hecla* during Lieutenant Parry's voyage. From 1825 to 1829 he commanded the *Blossom*, which sought to cooperate by way of Bering Strait with Arctic expeditions approaching from the eastward. Having been promoted to be captain, he in 1835-36 explored a part of the South American coast and from 1837 to 1847 was employed on the Irish coast survey. He was made rear admiral in 1854, and a year later he was elected president of the Royal Geographical Society. He was the discoverer of Ports Clarence and Grantley and published *A Voyage of Discovery towards the North Pole* (1848).

BEECHER, SIR WILLIAM (1758-1839). An English portrait painter. He was born at Burford, in Oxfordshire, Dec. 12, 1758. He is said to have been a house painter before becoming a student at the Royal Academy. In 1793 he was made portrait painter to Queen Charlotte and won the patronage of the court and of the fashionable class. He was knighted by George III for his picture, now at Hampton Court, which represents the King reviewing troops, which also brought him the rank of R.A. His earlier drawings exhibit more care and finish than are shown in his later works, when his popularity was assured. As a mark of his industry, it may be noted that in 64 years he exhibited 362 portraits at the exhibitions of the Royal Academy. Among the famous people whom he painted were Lord Nelson, Lord Cornwallis, John Kemble, and Mrs. Siddons. He is well represented in the National and the National Portrait Galleries, London, and in many American collections, including the Metropolitan Museum of Art, New York. He was very popular in his day and is still counted among the most celebrated of English portrait painters, but he excels neither in line nor in color. His portraits of women lack grace, as those of men character. Consult Redgrave, *A Century of Painters of the English School* (London, 1866).

BEEDEE. See BIDAR.

BEE EATER. A bird of the family Meropidae within the order Coraciiformes. They are related to rollers, kingfishers, and jacamars, and in the Old World play the same rôle that the latter do in our tropics. The 40 members of the family are mainly African or Oriental. They have rather long beaks and long swallow-like wings, giving them great grace and speed in flight and enabling them to capture insects on the wing. All wear a gorgeous plumage, green being the prevailing tint, and all the species have suffered great persecution from those who collect feathers and skins for millinery purposes. The common bee eater (*Merops apaster*) is perhaps the most beautiful bird of Europe. The crown and mantle are rich chestnut, passing lower down into purplous, the head white and black and the throat yellow, while the rest of the plumage is mainly vivid greenish-blue. Like several related families, the bee eaters breed in holes in earthen banks, sometimes 6 to 8 feet long and of their own digging, and often gather in great colonies, the shining white eggs rest upon the earth, but become half buried after a time in the wings and rejected parts of insects. The food of these birds consists almost wholly of bees and wasps. They congregate about beehives and, swooping close to them, seize and consume honeybees in great numbers, until the

cessation of flowers in August, and consequently of bee work, compels these birds to migrate southward. In mid-Africa the natives observe their movements as a guide to stores of wild honey. See Plate of KINGFISHERS, MOTMOTS, ETC.

BEEF. See MEAT.
BEEF'EATER, or **BUFFALO BIRD**. See OXPECKER.

BEEFEATER (*beef* + *eater*, menial, cf. AS *hlafaeta*, servant, from *hlaf*, loaf + *etan*, to eat). The popular designation for the British sovereign's Yeomen of the Guard. Since the reign of Henry VII they have formed part of the monarch's train at royal banquets and other state occasions. Their costume, maintained with unimportant alterations for nearly four centuries, has much to do with their attractiveness to sight-seers. The appellation is commonly, but erroneously, supposed to be a corruption of the French *beaufetier* or *buffetier*—one who attends the buffet, or sideboard. Skeat maintains that it means simply *eater of beef*, a servant or dependant, and quotes *eaters* (from Ben Jonson) and *pouder-beef-lubbers*, similarly used. Consult Preston, *Yeomen of the Guard* (London, 1887). See YEOMEN OF THE GUARD.

BEE-FLY. A fly of the family Bombyliidae, many of which resemble bees in general appearance, their bodies being more or less covered with dense whitish or yellowish hair. Some resemble bumblebees, while others are much more slender. They are flower-flies, living upon the nectar of flowers, and are efficient agents in the cross fertilization of plants, the pollen adhering readily to their hanks. The larvae are parasitic in the egg-pods of grasshoppers and also prey upon caterpillars, such as cutworms.

BEEFSTEAK CLUBS. A number of well-known social clubs, formed for the most part in London in the eighteenth century. The earliest of these was founded in 1709, with Richard Boscourt, the actor and friend of Steele, as *proprietor*, and having as members many of the wits, authors, and men of affairs of the day. The most famous of the clubs, however, was the "Sublime Society of Stinks," founded in 1735 by John Rich, then manager of Covent Garden Theatre. The story is told of the formation of this club that Lord Peterborough supped accidentally with Rich on steak and beer, and found these so much to his taste that the meetings became regular. They were held in a room in the theatre, and, as in all true Beefsteak clubs, the refreshments were limited to steaks with beer or wine. Hogarth, Thornhill, Wilkes, Garrick, Dodington, Aaron Hill, Leonidas Glover, Beard, the tenor, and other famous men belonged to this club. In 1785 the Prince of Wales joined the "Stalks" and afterward the Dukes of Clarence and Sussex and the Duke of Norfolk became members. Other devotees were the poet Morris and John Kemble. After the burning of Covent Garden, the "Sublime Society," as it was called, had rooms first in the English Opera House, then in the Bedford Coffee House, and finally in the Lyceum (1838), where it remained until it disbanded in 1867. Sheridan founded a Beefsteak Club in 1749, with Peg Wadlington as president, and with rooms in the Royal Theatre, Dublin. The present Beefsteak Club of London was established in 1876 with rooms in Toole's Theatre. In the United States the well-known newspaper correspondents' organization of Washington, D. C., the "Gridiron," is in a general way

similar to the English clubs. Consult Arnold, *Life and Death of the Sublime Society of Steaks* (1871).

BEEF TEA A light article of diet for sick persons and convalescents, which should contain some of the proteids—i. e., nitrogenous nutritive material of meat, as well as the extractives—generally prepared by placing scraped or chopped lean beef in a glass jar with cold water. After standing for half an hour or so, the jar, which should be tightly covered, is placed in a saucepan of water and gradually heated. For the first hour the temperature should be below the coagulating point of meat protein (167° F.). It should then be allowed to boil a short time to take away the raw taste and coagulate the red coloring matter. A little salt is then added to suit the taste. Beef tea has little food value, but it is somewhat stimulating to the appetite. It should not be given in heart disease (where a decreased amount of fluid is desirable), gout, or kidney disease. Mutton, treated in a similar manner, yields a broth which is believed to be somewhat less easily digested and may be hurtful, to invalids especially, if the fat be not skimmed off from the liquid. A knuckle of veal affords a similar broth or tea. Chicken broth, perhaps, the most readily digested and is especially suitable for invalids in cases of great irritability of the stomach.

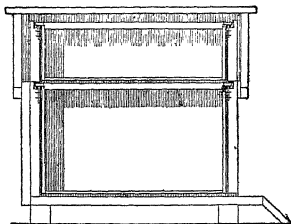
BEEFWOOD See CASUARINA.

BEE KEEPING The several common races of the honey bee are known as the common black, brown, or German, the Italian, the Carniolan, and the Cyprian. The German race shows considerable variation in its markings and qualities, the workers have a dull rusty-brown color, specially about the thorax. Their disposition is shy toward and sting a person approaching the apiary and of stinging when they are manipulated, and other faults, have put them in disfavor. The Italian race, golden-yellow in color, requires less skill in subduing and handling and is perhaps the most popular. The Carniolans, say bees from the elevated Alpine province of Jainsiola, Austria, is the largest race and grow steadily in favor. The Cyprian, the yellowest of the original races, is native to the island of Cyprus. Though smaller-bodied and more slender than bees of the European races, they have produced the largest yields of honey. Other races not known as the Egyptian, Syrian, Palestinian, and Tunisian.

The *apary* or stock of beehives should, of course, be situated in a neighborhood where flowers sufficiently abound for the supply of honey. It is, however, by no means certain to what distance bees roam. Some authors mention a mile as the probable distance, but the opinion has apparently been hazarded on mere conjecture, and there seem to be good reasons for supposing that a much greater distance might more correctly be named. But whatever distance bees may be capable of traveling in quest of honey, it is undoubtedly of great importance that they should have good feeding ground in the immediate neighborhood of the apiary, and in many parts of the world the practice prevails of removing them from place to place, according to the season, in order that advantage may be taken of the greatest abundance of flowers. Thus in the south of Scotland beehives are very frequently removed to heath-covered tracts in the beginning of August, and remain there till the heath is out of flower, and this affords in many

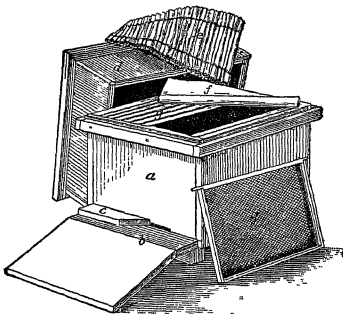
parts of the country the most plentiful honey-harvest, although in other parts, especially where white clover abounds, the greatest quantity of honey is obtained earlier in summer.

As to the form of beehives, and the material of which they should be made, there are great differences both of opinion and practice. Glass



SECTION OF BOX HIVE

hives, and hives with glass windows, which can be covered at pleasure with wooden slides, are employed by those who wish to observe the movements and habits of bees, but for profitable purposes wood and straw are the materials in common use. In some parts of Europe cylindrical cork hives are much used, made by removing the wood of a portion of the cork tree, and leaving the bark uninjured, and hives of earthenware are common in Greece and Turkey. Frame hives, properly managed, are most successful. The hive which is most used in the United States, and which, with slight modification, has been adopted in England and her colonies, was invented by Langstroth. It is important that the owner should have facilities for giving in-



BOX HIVE

Dadant-Quinby form of Langstroth hive, open. *a*, front of brood apartment, *b*, alighting board, *c*, movable entrance block, *d*, cap, *e*, straw mat, *f*, carriage-cloth cover for frames, *g, g*, frames with combs. (From Langstroth.)

creased room both above and below the stock-hive, increased room above is required for the reception of pure honeycomb unmixed with brood, and the capability of adding to the hive below, by raising it up an additional story, is

often requisite to prevent swarming, which is incompatible with the collection of a large store of surplus honey.

Bees require attention at the time of swarming, that they may not fly away and be lost. They require also to be fed during winter, when, on account of a bad season, the lateness of the swarm, or other cause, they have not enough honey to support them. A common rule is that the weight of the contents of the hive must be at least 20 pounds, that the bees may survive the winter without being fed, and even in this case a supply of food for a short time in spring promotes the activity of the bees and their summer prosperity. The food ordinarily supplied to bees is either the coarser kind of honey or sugar and water. Strong ale and sugar boiled is also frequently given as food. The practice has very largely prevailed of killing bees by fumes of sulphur in order to take from them their honey in the end of autumn, a portion only of the increase of the stock being kept through the winter. This practice still has its advocates, but the majority of bee keepers take only what they can by top boxes or supers, or by cutting out combs, preserving all hives which are not so light that there is no good hope of their surviving the winter.

When honey is to be taken from bees, the person doing it must be carefully protected from their stings by gloves, veil, etc. It is best done during the heat of a fine day, when the bees more readily leave the combs of the super that is taken away and return to their hive. A little gentle tapping generally causes them to leave the combs, and a feather is used for brushing off those which are slow to do so. The smoke of the common puffball causes them to fall down in a stupor, from which they speedily recover, and its use is very convenient. It is gathered and dried for the purpose. Chloroform is also sometimes used for the same purpose, but the effect is apt to be fatal, unless care is taken to choose the morning of a fine day, so that the stupefied bees may have time to recover in the air and sunshine. Objections which might be raised against stupefying substances for smoking bees do not apply to wood for this purpose, such as hickory or hard maple.

Bees are much less apt to sting when swarming than at other times, due to their being gorged with honey, and in general all the necessary operations are performed without gloves or veil and with perfect safety. The sting of a bee is to many persons a thing of no great consequence, although in some it causes great local inflammation and swelling, and general derangement of health. The application of a little ammonia usually relieves the pain, or an onion cut through the middle.

The apiary should, of course, be in a sheltered place and where it enjoys a good amount of sunshine. The hives are very generally placed at short distances in the open ground, but some bee keepers protect them by a shed. In the former case each hive is usually covered with a straw hood in winter, to keep away the rain, as dampness is particularly injurious to bees. For the avoidance of dampness, and to prevent the bees from coming in contact with the ground when they hang in a great cluster at the door of the hive—when the weather is hot and the hive very populous—each hive is raised to a height of at least 15 or 18 inches from the ground.

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BEEK/MANTOWN' BEDS. See ORDOVICIAN SYSTEM.

BEE LOUSE. A minute wingless fly parasitic on honeybees. One is known, *Brasilia cerca*, constituting the family Braulidae at the end of the dipterous series. It is similar to the LOUSE FLIES (Hippoboscidae), also known as FOREST FLIES. See FOREST FLY.

BEELEZEBUB, be-el'zê-bûb, or **BEELEZEBUL**. The name of the chief of the demons in Matt. x 25, xii 24, 27, Mark iii 22, Luke xi 15, 18, 19. It seems to be the Aramaic form of Baal Zebub, the god of Ekron. The alternative form, Beelzebub, though avoided in the Syriac, is well supported in the Greek manuscripts and is supposed to go back to *Baal*, 'lord,' and *zêbul*, 'habitation,' 'temple,' or, less probably, to *Baal*, 'lord,' and *zêbul*, 'dung.' A name meaning 'Lord of the (heavenly) mansion' might easily take on the meaning 'Lord of the (infernal) mansion.' The change of a god into a demon is a common religious phenomenon. See BAAL-ZEBUB.

BEEMSTER, bêm'stêr. A region about 15 miles north of Amsterdam in the Dutch province of North Holland, once a lake, and reclaimed at the beginning of the seventeenth century. It has an area of 17,825 acres and is very fertile and well adapted to cattle raising. The commune of Beemster has a population of 4689.

BEER (AS *bêor*, OHG *bior*, Ger *bier*, probably a dissimilation for 'breor' and connected with AS *brêowan*, OHG *brunwan*, Ger *brauen*, to brew, another etymology refers beer to AS *bêa*, barley). The term "beer," in its broadest sense, denotes any fermented liquor that has not undergone distillation. This definition of beer is very comprehensive and includes many varieties of fermented liquors not commonly known as beer. The name has also a more limited meaning. In England the name "beer" usually denotes some form of ale, and in the United States and in continental Europe the term is practically restricted to lager beer, which, however, is made in a variety of qualities. Brewing is the name given to the process of manufacturing beer, although, strictly speaking, the manufacture consists of two separate processes known as malting and brewing, which will be found discussed fully under BREWING.

Historically, beer is of great antiquity; it was manufactured by the Egyptians and afterward by the Greeks, Romans, and ancient Gauls. Among the ancient writers who mention beer are Herodotus, Tacitus, Pliny, Xenophon, and others. The Romans are supposed to have introduced the art of brewing beer into Britain, the only intoxicating beverages used by the Britons previous to the Roman conquest being mead and cider. Naturally the process of brewing practiced by these ancient peoples has been vastly improved upon by modern brewers, who have called in the knowledge of chemistry, bacteriology, etc., to aid them in perfecting their art. In certain sections, especially in parts of Germany, beer is prepared with malt hops and water.

only In other places, however, especially in America and England, for some of the malt is substituted corn, rice, cane-sugar syrup, inverted cane or beet sugar, glucose syrup, grape sugar, or prepared corn products

Varieties While beer is the generic name for all malt liquors, many of these liquors are known by other names, the principal of which will be enumerated and briefly explained

Ale would seem to have been the current name in England for malt liquor in general before the introduction of the use of hops from Germany about 1524 After this date the German word *Bier* ('beer') was used at first to distinguish the hopped liquor from ale, the unhopped As now used, ale signifies a kind of top fermentation beer containing more or less hops, but distinguished chiefly by its strength or high percentage of alcohol In the manufacture of ale the first fermentation is checked, while a considerable percentage of sugar remains undecomposed, which by the subsequent fermentation in the barrels is changed to alcohol and carbonic-acid gas The length of time which ale is left to ripen in the barrels is one week for mild ale, from two to four months for pale ale, and from 10 to 15 months for strong ale Burton ale may contain at times as much as 8 per cent of alcohol The Scotch ales are distinguished for the smallness of the quantity of hops used and for their vinous flavor They are fermented at a lower temperature than English ales, which are fermented at from 65° to 90° F India pale ale differs chiefly in having a larger quantity of hops

Porter is a kind of malt liquor which came into use in London in 1722 According to Leigh, "the malt liquors previously in use were ale, beer, and two-penny, and it was customary to call for a pint or tankard of half-and-half—i.e., half of ale and half of beer, half of ale and half of two-penny, or half of beer and half of two-penny In the course of time it also became the practice to ask for a pint or tankard of three-thirds (or, as it became corrupted, *three threads*), meaning a third each of ale, beer, and two-penny, and thus the publican was obliged to go to three casks for a single pint of liquor To avoid this trouble and waste, a brewer by the name of Harwood conceived the idea of making a liquor which should partake of the united flavors of ale, beer, and two-penny He did so and succeeded, calling it entire, or entire butt beer, meaning that it was drawn entirely from one cask or butt, and being a hearty, nourishing liquor, it was very suitable for porters and other working people Hence it obtained the name of porter, and was first retailed at the Blue Last, Curtain Road, Shoreditch The chief characteristics of porter are its dark-brown color, peculiar bitter flavor, and agreeable freshness in drinking It was originally brewed with malt roasted until slightly brown, now, however, under the improved system of brewing, pale malt, with the addition of some highly roasted malt (or other coloring matter) for the sake of color only, is used Enormous quantities are brewed by the London brewers A kind much stronger than ordinary porter or ale is also extensively brewed in London, Dublin, and elsewhere, under the name of *stout* It is quite dark in color and has a pronounced caramelized malt-like aroma and taste If the product is young, its taste is sweetish, but after aging it assumes a characteristic tartness

Lager beer, which is now so extensively manufactured in the United States, takes its name from the fact that it is kept several months in a storehouse (*Lager* in German) to ripen In the manufacture of lager beer this long storage is not usually practiced in the United States The wort is prepared in much the same manner as for ale, and is pumped from the hop-jack into shallow coolers placed in the upper stories of the brewery, and then passed over a pipe cooler or through a refrigerating apparatus until it is reduced to a temperature of about 45° F. Thence it is carried in pipes to large fermenting tuns and placed in cool cellars, or in chambers cooled by ice or artificial refrigeration, having a temperature of 40° to 45° F Here yeast is added, which, in the course of about 15–24 hours, incites fermentation, this being manifested by the appearance of minute bubbles of carbonic-acid gas, which, as in the fermentation of ale, carry a little of the yeast with them This does not, however, remain there, but, discharging the gas, to which it had adhered, settles to the bottom in the form of a viscous mass, this mass, with that which remains there, constituting what is called bottom yeast The slow fermentation employed in the process of making old-type lager beer causes a clarification and the commencement of a ripening, which affords a beverage free from the objectionable qualities of the common beer that goes under the same name, but which is known to brewers under the name of *Schweb-bier*, or *present-use beer* This is fermented in a much shorter time, but the saccharine and other matter is not fermented to the same extent as in the German article It must be noted, however, that, owing to the introduction of improved processes of fermentation, clarification, and impregnation of beer with carbonic-acid gas into the American brewing industry many of these objectionable features are now removed For the purpose of neutralizing what acetic or other acid might appear from a secondary fermentation, or for producing by interaction with it an additional quantity of carbonic-acid gas to give it "life," some brewers add in the operation of casking (racking) a quantity of bicarbonate of soda, immediately upon which the bung is driven in and the beer is ready for market German lager, however, lies a long time to ripen, and attains certain qualities not possessed by any other kind of beer, and highly prized by lovers of this beverage The lager beer brewed in the United States can very appropriately be called an American type of beer because the American has cultivated his taste for this style of brew In the United States beer is drunk much more rapidly and colder than in Europe. *Bock beer* is lager beer of extra strength and containing more alcohol, made in the spring of the year It requires two months to brew and ripen, and in making it 1 pound of hops to 3½ bushels of malt are used

Among the less-known varieties of beer must be mentioned the following "Brunswick Mumme" is a peculiar kind of beer formerly used in Great Britain and still used in Germany and somewhat in the United States It is made of malt and wheat, to which some brewers add oats and bran meal It is neither so wholesome nor so agreeable as common ale or beer

Another kind of beer, sold in California and vicinity, which is becoming popular, is *steam beer* It derives its name from the fact that it is highly effervescent and under high pressure,

thus resembling the properties to some extent of confined steam. For the process of preparing this beer, see article on BREWING.

In Pennsylvania a bottom fermentation beer containing very little alcohol is sold under the name of *succalee*. The name in all probability is a corruption of the German "Schwenke." The materials employed in its preparation are malt, hops, yeast, water, and some condiment like anise.

Another variety of beer (top fermentation) sold in Germany and to some extent in the United States is *Weiss beer* ("white beer"). The *Beirn Weiss beer* is prepared from wheat, barley malt, hops, and water. After about a three-days fermentation the beer is filled directly into bottles and jugs and stored for about 8 to 14 days, after which it is ready for consumption. The material used in the preparation of American Weiss beer rarely includes wheat, and in most instances it is made from barley malt and corn gists. The mashing process also differs somewhat from the European method.

Malt extracts or malt tonics are fermented beverages made from high-dried malt with an addition of either caramelized malt, black malt, or roasted corn, or a combination of several of the latter and hops and water. They are brewed in with a heavy original (wort) gravity (16 to 18 Balling). This class of preparations usually contains more alcohol and solids than the ordinary lager beer, and their sale is confined almost exclusively to the drug trade. The term "malt extract" must not be confused with the unfermented extract of malt, which is sold chiefly in a thick, syrup-like form. The latter preparations, if properly prepared, contain a starch-digesting enzyme and are used in medicine. The fermented beverages do not contain this enzyme.

Spontaneous fermentation beers are those in which the fermentation is incited by yeast, bacteria, etc., which fall into the wort accidentally and are sold chiefly in Belgium. They are not pure barley malt beers and are prepared with 40 to 50 per cent of unmalted wheat and barley malt. In Japan a kind of beer brewed from rice called *saké* is drunk.

In South America the Indians prepared and drank a beer made from corn, and known as *chica*, or *maize beer*, long before the Spanish conquest. The process following in making *chica* is similar to that of beer brewing. The maize is moistened with water, allowed partially to germinate, and dried in the sun. The maize malt so prepared is bruised, treated with warm water, and set aside until the fermentation is over. The *chica* or maize beer has a yellow color and a pleasant acid taste. In the valleys of the Sierra the maize malt is chewed between the teeth by the Indians and members of their households, and the chewed morsel, incorporated with the saliva, is put in jars with hot water, when the fermentation proceeds more rapidly than before, and a more highly prized beer is obtained. The *chica* is also made from barley, rice, peas, manioc, pineapples, and grapes. The Chin Tatars prepare a beer from millet seed, called *bouza*, or *millet beer*. The same seed is used in Sikkim, on the southern slopes of the lower Himalayas, and yields beer there called *murwa*. The Arabians, Abyssinians, and many African tribes employ *teff*, the seeds of *Poa abyssinica*, and millet seed as sources of beer. The Russians prepare a beer from rye called *kvass*, or *rye beer*. The Tatars fermented milk

into *louniss*, or *milk beer*. The Arabians used the milk to yield then *leben*, and the Turks to produce then *yauort*. In the north of Scotland, the Oikneys, and some parts of Ireland, buttermilk or soui milk is allowed to stand till fermentation begins, and an intoxicating liquor results. The South Sea Islanders prepare a beer from the root of *Macoppe methysticum*, or the intoxicating long pepper, which is called *ala*.

Composition. The exact composition of beer is not accurately known, but the principal constituents are water, alcohol, dextrin, maltose or malt sugar, glycerin, several kinds of acids, protein, the essential oil and resin, from the hops, and mineral salts. Ale and beer, and especially lager beer, contain considerable nutriment in the sugar and dextrin that they hold in solution, and in certain parts of Germany, where lager beer is very freely drunk, it seems to take the place to some extent of other food. The bitter substances that enter into its composition appear also to exercise a mildly tonic effect. The percentage of alcohol by weight in the most popular ales and lagers is as follows: Burton Ale, 8.25; Guinness's Stout, 6.29; Scotch Ale, 4.41; New York Lager, 3.85; Munich Lager, 3.74; Schenk-bier, 3.00. For statistics of production see LIQUORS, FERMENTED AND DISTILLED, STATISTICS OF.

BEER, *bar*, ADOLF (1831-1902). An Austrian historian, born at Prossnitz, Moravia. He studied history, philology, and political economy at the universities of Berlin, Heidelberg, Prague, and Vienna. In 1858 he was appointed professor at the Commercial Academy of Vienna, and in 1868 he was called to a similar chair in the technical high school in that city. As one of the foremost promoters of educational reform in Austria, he received in 1870 an important appointment in the Ministry of Education. He was elected to the Reichsrath in 1873 and became a member of the Upper House in 1897. The following are a few of the principal works of this prolific author: *Allgemeine Geschichte des Welt-handels* (1860-84); *Die Finanzen Oesterreichs im 19ten Jahrhundert* (1877); *Die orientalische Politik Oesterreichs seit 1774* (1883); *Die oesterreichische Handelspolitik im 19ten Jahrhundert* (1891); *Joseph II und Graf Rudolph Cobenzl, ihr Briefwechsel* (2 vols, 1901).

BEER, GEORGE LOUIS (1872-) An American historian and educator, born on Staten Island, New York City. He graduated from Columbia University in 1892 and in the following year took the degree of A.M. From 1893 to 1903 he was engaged in the importation of tobacco from Cuba, and during a portion of this period (1893-07) was also a lecturer on European history at Columbia University. He became a member of many historical and other learned societies. His writings on historical subjects include *Commercial Policy of England toward the American Colonies* (1893); *British Colonial Policy, 1751-65* (1907); *Origins of the British Colonial System, 1778-1660* (1908); *Old Colonial System, 1660-1754*: part 1, in 2 vols., *Establishment of the System, 1660-1688* (1913).

BEER, MICHAEL (1800-33). A German dramatic poet, born in Berlin. He won a considerable success with his tragedy of *Kyilmestras* (Berlin, 1819). His other works are *Die Braute von Aragomen* (1819); *Der Para* (1823), a one-act tragedy, which depicted the situation of the Jew in modern Germany and

was praised by Goethe, and *Struensee* (1828), his most successful work, for which his brother, the famous composer, Meyerbeer, wrote an overture and incidental music. His complete works were edited by Edward von Schenk (1835), who also published a volume of his correspondence (1837). Consult Paul Hoffman, "Urkundliches von Michael Beer und über seine Familie" in *Luphonor* (vol xv, 1908).

BEER, WILHELM (1797-1850) A German astronomer, brother of the preceding. In the Thiergarten of Berlin he built an observatory, where, with his friend Madler, he made a particular study of Mars and the moon. His map of the moon (1836) was awarded the Lalande prize by the French Academy. In 1840 he became a member of the Prussian First Chamber. He published *Der Mond nach seinen kosmischen und individuellen Verhältnissen* (2 vols, 1837) and *Die Dreikönigsverfassung in ihrer Gefahr für Preussen* (1849).

BEERBOHM, MAX (1872-) An English author and caricaturist, half-brother of the actor, Sir Beerbohm Tree. He was educated at Charterhouse and at Merton College, Oxford, and began a not very prolific literary career with contributions to *The Yellow Book*. Lord Northcliffe, then Mr Alfred C. Harmsworth, recognized his talent and secured his services for papers under his control. Thus launched, he became a contributor to many London periodicals. As a caricaturist, his talent is unmistakable, and he hit off the eccentricities and peculiarities of the leading figures of English social and political life in a long series of drawings—there have been five exhibitions of them since 1901—which highly amused the London public. In 1895 he spent some months in America with Beerbohm Tree, and in 1910 he married Florence Kahn of Memphis, Tenn. His books, excepting his one novel, *Zuleika Dobson*, are largely composed of material originally contributed to periodicals. His novel does not represent him at his best. It is a satirical and burlesque story of Oxford life. His reputation rests properly upon his essays, satires, and skits, which made him the pet of a London literary circle. Brilliant, *blasé*, irresponsible, audacious, egotistical, and with the courage of his lack of convictions, he belonged logically to the Wilde and Beardsley period. In a jest not without truth, he himself declared, in 1900, that he was already outmoded. Be this as it may, there is a wit, an elegance, a piquancy, and an aroma to his style that are all his own, and lend him a certain distinction. His published work includes the slender volume, *The Works of Max Beerbohm, More; Yet Again*, and *The Happy Hypocrite*, all brought out between 1896 and 1900, and *Caricatures of Twenty-five Gentlemen*, *The Poet's Corner*, *The Second Childhood of John Bull*, *A Book of Caricatures*, *Zuleika Dobson*, *A Christmas Garland* (a series of parodies), and *Fifty Caricatures* which appeared between 1900 and 1914.

BEERE, MRS BERNARD (1859-) An English actress. She was born at Norwich, a daughter of Mr Wilby Whitehead. After studying as the pupil of Hermann Vezin she began her dramatic career in 1873 at the Opera Comique, London. Her marriage, not long afterward, took her from the stage, but she returned to it as Mrs Bernard Beere and in 1883 attracted notice in *Fedora* and as the Countess

Zicka in *Diplomacy*. In 1888 she played at the Opera Comique in *As in a Looking-Glass* and *Masks and Faces*. She visited America in 1892. In 1897, after another retirement, she reappeared in *Charlotte Corday* and *A Sheep in Wolf's Clothing*. In 1900 she became the wife of H C S Olivier. Her last appearance was at the Coliseum in 1905, in a sketch called *The Spy*.

BEER MON'Y A peculiar payment to non-commissioned officers and soldiers in the British army, established in the year 1800, at the suggestion of the Duke of York. It consisted of one penny per day for troops when on home service, as a substitute for an issue of beer and spirits. It continued as an addition to the daily pay until 1873, when, the stoppages for rations having been abolished, the opportunity was taken to consolidate beer money and pay proper.

BEERNAERT, bar'nart, AUGUSTE MARIE FRANÇOIS (1829-1912) A Belgian statesman, born at Ostend. He was elected a member of the Chamber of Deputies in 1874 and in 1884 received the portfolio of agriculture, industry, and art. Soon afterward he was appointed President of the Council and Minister of Finance. He proved to be exceedingly skillful in dealing with many important questions, such as the revision of the constitution and proportional representation in the elections. Owing to the lack of adequate party support in connection with the latter measure, he resigned in 1894. In 1895 he was elected President of the Chamber of Deputies. He was a leading member of the International Peace Conference, both in 1890 and in 1907. In 1909 he received one-half of the Nobel peace prize.

BEERS, CLIFFORD WHITTINGHAM (1876-) An American social worker, born in New Haven, Conn. He graduated from the Sheffield Scientific School in 1897. As a result of over study and other conditions, he lost his reason and was for several years an inmate of sanitariums and asylums. He recovered and in 1908 published a remarkable book entitled *A Mind that Found Itself* (2d ed., 1912), an account of his experiences in the institutions where he had been confined, in addition to being a psychological study of the progress and development of his disease and his final return to mental health. It is one of the few authentic documents written by those who have lost their reason and recovered it. In 1909 he helped to found the National Commission for Mental Hygiene, a body organized for the study of mental diseases and the treatment of those suffering from them. He was also an organizer of the Connecticut Society for Mental Hygiene, and became its executive secretary. In addition to the book mentioned above, he wrote *The Value of Social Service as an Agency in the Prevention of Nervous and Mental Disorders*, and *A Society for Mental Hygiene as an Agency for Social Service and Education*.

BEERS, ETHEL LYNN (1827-79) An American poet, born at Goshen, N Y. Her earlier writings appeared under the name of ETHEL LYNN, derived from her baptismal name, Ethelinda. By birth an Eliot, descendant of the famous New England apostle to the Indians, she married William H Beers and afterward used her full name. She is best known for the war lyric, "All Quiet Along the Potomac," which appeared in *Harper's Weekly* in 1861. The authorship of this popular poem was soon claimed

for others, especially for a Southerner, but Mrs Beers's right to it is undisputable. Her verses were collected just at the time of her death in a volume entitled *All Quiet Along the Potomac, and Other Poems* (1879).

BEERS, HENRY AUGUSTIN (1847-) An American professor and litterateur, born in Buffalo, N. Y. He graduated at Yale in 1869 and taught there from 1871 to 1875, when he was made assistant professor of English literature and in 1880 professor. His chief publications are a collection of verses, *Odds and Ends* (1878), *A Century of American Literature* (1878), *Nathaniel Parker Willis and Prose Writings of N. P. Willis* (1885), a second collection of verses, *The Thankless Muse* (1885), *An Outline Sketch of English Literature* (1886), *From Chaucer to Tennyson* (1890), *Initial Studies in American Letters* (1891), *A Suburban Pastoral and Other Tales* (1894), *The Ways of Yale* (1895), *A History of English Romanticism in the Eighteenth Century* (1899), *A History of English Romanticism in the Nineteenth Century* (1901), *Points at Issue* (1904), *Milton's Tercentenary* (1910). Professor Beers became known also as a frequent contributor to periodicals.

BEERS, bars, JAN VAN (1821-88) A Flemish poet, born in Antwerp. In 1844 he became a librarian of the Antwerp Library and in 1860 professor of Flemish language and literature at the Athenaeum in that city. His works include *Levensbeelden* (1858), *Gevoel en Leven* (1869), *Rijpende blaren* (1883). Consult the biography by Pol de Mont (Haarlem, 1889).

BEERSHEBA, bē'er-she'ba or bē'er-shē-ba (Heb. beer, well + sheba, oath, or seven), the modern Bir-er-seba. One of the Simeonite towns in southern Judah (Josh. xix. 2). Two stories are told in explanation of the origin of the place and of the name. According to the one (Gen. xxi. 22-31), the place received its name as the "well of oath," because of the alliance formed here between Abraham and Abimelech, King of Gerar, which was ratified by a gift of seven ewe lambs from Abraham to Abimelech as a witness of the fact that the well was dug by Abraham. In further commemoration of the event Abraham is said to have planted a tamarisk at the place and to have invoked the name of Yahweh. The other account (Gen. xxvi. 26-33) ascribes the name giving to Isaac and apparently explains it as the well of "seven." Beersheba was situated in the extreme south of Palestine, about 52 miles southwest of Jerusalem. Its position led to the phrase "from Dan to Beersheba" as comprising Hebrew territory from north to south. Various interesting events are recorded by biblical tradition as having taken place at Beersheba. It was here that Abraham received the command to sacrifice Isaac (Gen. xxii.). In later days Isaac sojourned here. Esau was robbed of his birthright and blessing here (ib. xxviii. 10), and here Jacob sacrificed to Yahweh on his journey into Egypt (ib. xli. 1), the sons of Samuel were judges here (1 Sam. viii. 2), and to this place Elijah was forced to flee from Jezebel's wrath (1 Kings xix. 3) and from a locality in its neighborhood he set out upon his 40 days' journey to Horeb. Leaving aside these traditions, it is clear that Beersheba was the site of an ancient sanctuary to which importance was attached by the Hebrews as late as the days of Amos (Amos v. 5). As to the name, the sanctity attaching among the Semites to the

number seven makes it more plausible to explain the name as the "seven wells" in the sense of the "sacred well," rather than as the "well of oath" which appears to rest upon a play on the name. After the captivity Beersheba was occupied by the Jews. In the days of Eusebius it was great market town with a Roman garrison. Bishops of Beersheba are occasionally mentioned. The *notitia dignitatum* mentions Dalmatian as Illyrian troops as stationed there. The city found on the Madaba map. By the fourth century, however, it was deserted. There are extensive ruins on the northern bank of the Wady el Seba. On that side of the valley are also the seven wells, which supply excellent water, they are all from 5 to 9 feet in diameter and about 45 feet deep. The new town has grown up in recent years southwest of the old city. It is the seat of a *kaimakam*, has in the neighborhood of 1660 inhabitants, a serai, mosque, a post and telegraph office, a khan, and a number of stores. Consult Guerin, *Judée*, vol. ii, pp. 277 ff. (1869), Benzinger, in *Bacdec Palestine and Syria*, p. 170 (5th ed., Leipzig, 1912).

BEESLY, bēz'li, EDWARD SPENCER (1831-) An English scholar and historian. He was educated at Wadham College, Oxford, was professor of Latin at Bedford College (London) in 1860-89, and professor of history in University College (London) from 1860 to 1897. He also became editor of the *Postscript Review* and translated some of Comte's writings. His publications include also *Catalina, Clodius, and Tiberius* (1878), *Queen Elizabeth* (1892), *Strong Second Chamber* (1907). In his *Catalina* etc., he seeks to rehabilitate the three men with whom the book deals.

BEES'TON. A manufacturing town of Nottinghamshire, England, on the Trent, $3\frac{1}{2}$ miles southwest of Nottingham. It has important lace-making, machinery, cycle, and automobile factories. Pop., 1891, 6948, 1901, 8950, 1911, 11,336.

BEES'WAX The plastic material secreted by bees and used by them in making their cell. It is largely produced in Europe and in the United States and is an important article of export from various parts of Asia and Africa. Beeswax is a solid, tough substance, having pale yellowish-brown color, a specific gravity of about 0.96, and a pleasant odor resembling honey. It melts at 67°C (152.6°F). The crude wax is separated from the honey by pressure. The comb thus obtained is treated with water and heated and stirred until the wax melts. The wax is then run into a vessel of cold water, where it is further washed and allowed to solidify. As thus obtained, it is used on floors and for making sealing wax, lithographic crayons, and mastic varnish. Crude beeswax may be bleached by exposing thin shreds of the yellow wax to air and sunlight, the resulting wax is perfectly white and has neither taste nor smell. Wax may also be bleached with nitric acid and chlorine, although the latter combines with it. Candles made of wax have been bleached with chlorine yield, on burning, stifling vapors of hydrochloric acid. This fact, first investigated by Dumas, led to the establishment of the substitution theory in organic chemistry. The facility with which beeswax bleaches depends upon the variety of the wax. Certain varieties can scarcely be bleached at all. Bleached wax is employed in candle

making, and in modeling figures, flowers, and similar objects

BEET (AS *bete*, Lat *beta*) A genus of plants of the family Chenopodiaceae. There are about 15 species, mostly biennials, with smooth, ovate, stalked root leaves, and tall, leafy flowering stems. They are natives of the temperate parts of the Old World. The only species of economic importance is the *Beta vulgaris*. This has been in cultivation since before the Christian Era, and has been developed as a root vegetable, leaf vegetable, and as a foliage plant. The root-vegetable varieties, cultivated in gardens, constitute our table beets. Their color and form vary from dark blood-red to scarlet and white and from turnip shape to long tapering forms. The earlier and smaller varieties are usually turnip-shaped. As a vegetable, the garden beet is boiled, pickled, used as a salad, and the tops cooked for "greens." Young beets are extensively grown as an early market-garden crop in the vicinity of all the larger cities in the United States and are sometimes forced under glass (See VEGETABLES for illustration). Garden beets require a deep, rich, loose, well-tilled soil. The seed is sown as early in spring as the weather becomes settled, in drills 18 to 36 inches apart, and the young plants are afterward thinned to 4 to 6 inches in the row. The wider rows permit of horse-cultivation. Some 50 varieties of garden beets are grown in the United States. Of the early varieties, Early Blood Turnip, Eclipse, Egyptian, and Bassano are standard sorts. The Mangel-wurzel, or Mangold, is the variety now usually grown for cattle feeding. It is a coarser and very large form of the common beet. It is planted as soon as the ground can be tilled in spring, in drills 2 to 3 feet apart, and the plants are allowed to stand from 12 to 14 inches distant in the row. Further cultivation consists in keeping down the weeds, and shallow tillage. Golden Tankard, Golden Yellow Mammoth, and Mammoth Long Red are standard varieties. The sugar beet is a form of the common beet in which the percentage of sugar has been greatly increased by cultivation and selection. It is extensively grown in central Europe and in the northern and western United States for the production of sugar (See SUGAR BEET). The strain of the *Beta vulgaris*, which is grown as a pot herb, both leaf and leaf stalk being eaten, is generally known as Chard or Swiss Chard, and will be considered under the head of CHARD (q.v.). The foliage varieties of beets are grown for their ornamental value, and are used for bedding and for borders where strong and heavy effects are desired. The large leaves of the several varieties are richly marked with different shades of red, orange, silver white, and intermediate shades. Like all succulent roots, the beet has a high water content, 88 per cent, and owes its food value to the 10 per cent carbohydrates it contains. A little protein, fat, and ash are also present. Beets are cooked in many ways and are wholesome, palatable, and generally liked.

Beet Diseases. Beets are subject to a number of fungus attacks, some of which are confined to the leaves, others occurring upon the roots. The most destructive disease of the leaves is the leaf spot or blight, due to *Cercospora beticola*. The leaves are more or less covered with ashy spots, and later, by their drying up and falling away, little is left of the leaf

but the framework. When the attack is severe, the growth and maturity of the crop is affected to a considerable degree. Bordeaux mixture (see FUNGICIDES) will prevent this disease, if the leaves are kept well covered with it from June through the growing season. The fungus winters in the old leaves, which should therefore be collected and burned or they may be used as silage. A red rust caused by *Uromyces beta* and a white rust due to *Cystopus blitu* occur on the leaves. Both will yield to applications of the more common fungicides.

The fungus *Phoma beta* is quite destructive of beets in Europe, the leaves and roots being attacked. The leaves are blackened and the fungus follows them to the root, where a rot quickly sets in. Sugar beets are especially subject to this trouble.

Upon the roots the scab is one of the worst troubles. It is due to the same cause as the potato scab and will require the same treatment. A root rot due to *Corticium vagum solani* is troublesome in Europe. Small roots are killed and larger ones injured by the fungus, which readily survives in the soil. On this account, where the disease has appeared, other crops should be grown for a number of seasons. This disease, so far as reported, is most destructive to sugar beets. A bacterial disease of sugar beets is reported. The roots are not killed, but their sugar content is considerably reduced. It may be recognized by the greater prominence of the fibres in a cut section of the root, by the difference of color, and by less solid structure. No certain means for its prevention are known. Curly top, a disease recognized by the curled leaves, is rather common on sugar beets in the West. Its presence is usually accompanied by a diminished sugar content. Various insects, fungi, and other agents have been reported as the cause of this trouble.

BEET, JOSEPH AGAR (1840—) An English divine, lecturer, and author. He was born at Sheffield and was educated at Wesley College, Sheffield, and at Wesleyan College, Richmond. For 21 years he was engaged in pastoral work, from 1885 to 1905 he was a theological tutor at Wesleyan College, Richmond, and he was one of the original members of the faculty of theology in the University of London. The University of Glasgow conferred upon him an honorary D.D. Dr Beet delivered the Fernley Lecture on the "Credentials of the Gospel" in 1889, and in 1896 came to America, where he gave a series of lectures at the University of Chicago, at the summer schools of Chautauqua, and at Ocean Grove. Two of his theological works have been translated into Japanese and have been adopted as text-books in Japan. His publications include *Credentials of the Gospel* (1889), commentaries on St Paul's epistles, *Through Christ to God* (1892), *The New Life in Christ* (1895), *The Last Things* (1897, 1913)—in all of which he brings the methods of science and philosophy to bear upon the theological questions which he treats. He published, besides the books already named *A Manual of Theology* (1906), *Church, Churches, and Sacraments* (1907), *The New Testament Its Authorship, Date, and Worth* (1909), *The Old Testament Its Contents, Truth, and Worth* (1912), *A Key to Unlock the Bible* (reissue, 1913).

BEETHOVEN, bî'to-ven, LUDWIG VAN (1770-1827). A German composer, the unsurpassed master of instrumental music. He was baptized

in Bonn, Dec 17, 1770, and it is generally assumed that he was born on the preceding day. His father Johann (c1740-92) was a singer in the electoral chapel at Bonn, and his grandfather Ludwig (1718-78) had also been a singer, and since 1761 *Kapellmeister* at the same chapel. When only four years old, Beethoven showed decided love for music, so that his father, a weak and shiftless character and a very mediocre musician, began to instruct him on the piano and violin, not for the sake of cultivating a great talent, but for the sordid reason of exhibiting his son as a musical prodigy. Accordingly he proved a relentless and cruel taskmaster. In 1779 the boy was placed under the instruction of Tobias Pfeiffer, an excellent musician, who, however, left Bonn the next year. Beethoven's unusual talent was now so evident that the Elector charged himself with the expense of his further musical training. Thus the court organist Van den Eeden, who was also a remarkably fine pianist, became Ludwig's teacher on both organ and piano. After this teacher's death, in 1781, the instruction was continued by the new court organist, C G Neefe. It was he that first introduced his pupil to the mysteries of musical composition. In 1782 young Beethoven became Neefe's assistant at the organ, while at the same time he played viola in the orchestra. When only 13 years old, he conducted, during Neefe's occasional absences, the opera rehearsals at the piano. As early as 1781 he wrote his first compositions, a set of variations on a march by Dressler and three sonatas for piano, all of which show a remarkable command of form. Nevertheless, it was his playing, rather than his compositions, that at this time evoked general admiration.

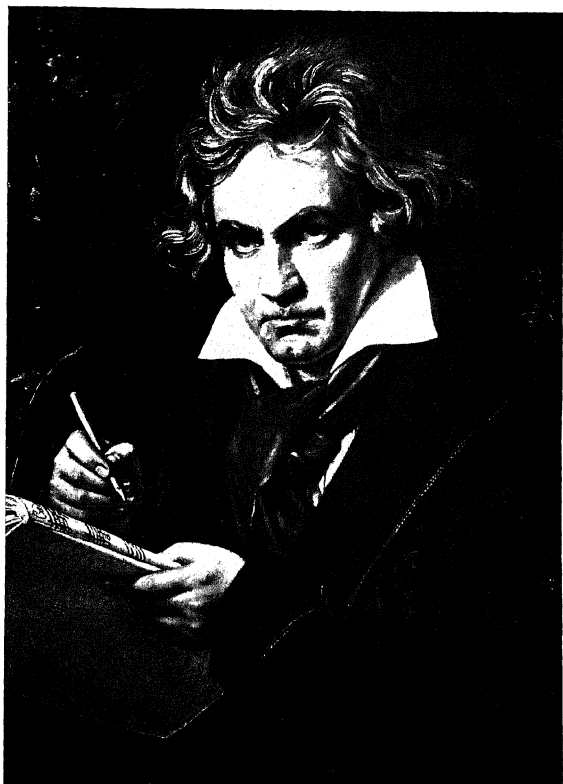
In the spring of 1787 Beethoven visited Vienna, at a time when Gluck, Haydn, and Mozart were living there. On that occasion the boy's masterly improvisation elicited those prophetic words from Mozart "Keep your eyes on him, some day he will make a stir in the world." According to Ries, Beethoven actually had a few lessons from the famous master, who would have accepted the young man as a pupil had he not been entirely absorbed in the composition of *Don Giovanni*. Alarming news from home caused Beethoven to terminate his visit abruptly, he reached home only a few days before his beloved mother died of consumption on July 17, 1787. After her death home life became almost unbearable, for the weak father now abandoned himself completely to the vices of intemperance.

Under these circumstances it was fortunate for the young man that already before his visit to Vienna his masterly playing had been the means of introducing him as a teacher into some of the best families of Bonn. Among these was the widow of the Privy Councillor Von Breuning, two of whose children, Stephan and Leonora, became and remained Beethoven's fast friends throughout life. Mrs von Breuning treated the young musician as her own son. In this cultured and refined family Beethoven spent the greater part of his time, and here he first became acquainted with the masterpieces of German and English literature, for his general education had been sadly neglected. In fact, he had not attended school since his thirteenth year. Among the men whom he met at this time two play an important rôle in his life. Dr. Gerhard Wegeler and Count Wald-

stein. The former married Leonora von Breuning and, together with Beethoven's pupil, Ferdinand Ries, wrote a biography of the master, the latter, a Viennese by birth, came to Bonn in 1787 and immediately divined the extraordinary genius of the young man. It is almost certain that he was instrumental in persuading the Elector to send Beethoven to Vienna. In 1790, on his first journey to England, Haydn passed through Bonn, and the Elector personally introduced his young organist to the famous master. Definite arrangements for a course of instruction under Haydn were probably not made till Haydn's second visit on his return from London in July, 1792. By the end of October everything had been settled. Under date of Oct 20, 1792, Count Waldstein wrote the following parting letter "Dear Beethoven—You are now about to depart for Vienna. The long-delayed fulfillment of your wishes is at hand. The Genius of Mozart is still lamenting the death of his pupil. With the fettle Haydn he has found a refuge, but no occupation. Through him he desires once more to be joined to some mortal. By means of untiring application you will receive the Genius of Mozart from the hands of Haydn."

According to Thayer, Beethoven arrived in Vienna about Nov 10, 1792. In his quality of court organist of the Elector of Cologne, an uncle of the reigning Emperor of Austria, Leopold II, and as the protégé of Count Waldstein, who was related to some of the noblest families of Vienna, Beethoven was immediately admitted to the most exclusive circles. Without delay he began his lessons with Haydn, but before long the critical pupil discovered that the famous composer was a poor teacher. As arrangements had been made by the Elector for Beethoven to study with Haydn personally, it was impossible to change teachers without giving offense. Therefore, in order not to lose his time, Beethoven visited Haydn regularly, but secretly he had arranged with Johann Schenk (q.v.) for a thorough course in counterpoint. When at the end of 1793 Haydn undertook his second journey to England, he sent his pupil to the famous theorist Albrechtsberger (q.v.). With him Beethoven spent an entire year, until May, 1795, reviewing simple and double counterpoint and taking up canon and fugue. A considerable number of exercises of this time have been preserved. They show the same painstaking care and critical attitude that characterized the master's method of production throughout his career.

While Beethoven was thus pursuing a systematic course of instruction under his teachers, he did not entirely neglect original composition. Ever since his first attempts in 1781 he had continued composing, but his productivity was not by any means prolific. The fact that he never published any of these works in their original form seems to prove conclusively that he regarded those early attempts merely as a preparation for his future career. In this connection it may be stated that as recently as 1911 the manuscript of a symphony, bearing on its title-page the name of Beethoven, was discovered by Dr Stein in the archives of the University of Jena. Internal evidence shows that the work is undoubtedly a genuine work of Beethoven, and that it antedates the symphony which the master himself published as his first. External circumstances point to a period before 1792 as the probable date of composition.



LUDWIG VAN BEETHOVEN

FROM A PAINTING BY CARL STIELER, IN THE POSSESSION OF THE COUNTESS VON SAUEMAN, BERLIN

From the very beginning the musical atmosphere of Vienna seems to have exerted a beneficial influence on Beethoven's productive activity, for, considering the time spent in writing exercises for his teachers, the number and dimensions of the works that originated between 1792 and May, 1795, is remarkable. The fact that he published nothing before 1795 affords striking proof of the severe self-criticism to which he always subjected his own works.

In the year 1795, in his twenty-fifth year, Beethoven began his public career. In March he appeared in one of Haydn's concerts with his own concerto for piano and orchestra in C, in the double rôle of virtuoso and composer, and in October his opus 1, three trios for piano, violin, and 'cello, appeared in print. Before that time he had played only in the circles of the nobility to which he had been introduced by Count Waldstein. Here his remarkable talent found immediate recognition and secured for him an exceptional position. Many anecdotes are told of Beethoven's independence of spirit and lack of social manners. Frequently this led to unpleasant incidents and even temporary estrangement from his best friends, but in the end all such breaches of etiquette were overlooked and pardoned.

With his friend and patron, Count Lichnowsky, Beethoven visited Prague in 1796 and played in the houses of the nobility. The flattering reception accorded to him in these circles induced him to visit also Dresden, Leipzig, and Berlin. In the Prussian capital he played at court, and King Frederic William II was so impressed that he tried to induce the young master to settle in Berlin. But the King's death in the following year prevented the plans from being carried out. Of the next three or four years practically nothing is known beyond the fact that Beethoven spent the summer of 1797 in Pressburg and Pesth and that he fell seriously ill. To this illness is attributed an affliction of the ear which slowly but steadily impaired the master's sense of hearing, and about the year 1819 resulted in total deafness.

Not until his thirtieth year did Beethoven appear before the general public in his own concerts. Before that his public appearances, few and far between, had been restricted to concerts given by other artists. The remuneration he received for playing at the houses of his patrons was sufficient to relieve him from the necessity of accepting a regular position or giving lessons. All his time was devoted to composition. It is true that then, and also later, he did accept specially talented pupils, but not from necessity. Among the very few persons that could boast of having had personal instruction from the great master were the Archduke Rudolf, Karl Czerny (q.v.), and Ferdinand Ries. On April 2, 1800, Beethoven gave the first concert of his own compositions. Of the works that were then performed for the first time, the beautiful Septet, op. 20, and the First Symphony, op. 21, quickly found their way into the regular concert repertoire throughout Austria and Germany and spread the fame of their author. At comparatively short intervals one great work followed another, so that within three or four years Beethoven was a prominent figure in the world of music, even publishers began to vie with one another for the possession of works by the new master, whose name was men-

tioned by many reviewers in the same breath with Haydn and Mozart. For his concert of the year 1803, at which the Second Symphony, the third concerto for piano and orchestra, and the oratorio *Christus am Oberg* had their first hearing, the prices of admission were doubled. At irregular intervals Beethoven gave such concerts, which he called "academies," and at which only his own works were performed.

In 1808 Jerome Bonaparte, King of Westphalia, sought to attach the famous Vienna master to his own court at Cassel by offering him 600 gold ducats and the title of *Hofkapellmeister*. No sooner did this news become known in Vienna than Archduke Rudolf and the counts Kinsky and Lobkowitz pledged themselves to the payment of 4000 florins annually if Beethoven would refuse the King's offer and remain in Vienna. After he thus found himself in comfortable, even affluent, circumstances, he began to entertain plans for extended concert tours, especially to London, but the unsettled condition of affairs due to the Napoleonic wars prevented the realization of these schemes. Therefore the master remained in his adopted city, devoting himself to the creation of imperishable masterpieces.

Up to that time the fame of Beethoven had been limited to the circles of musicians and the more serious music lovers. The general public did not understand the new works, and their attitude was one of respectful admiration for the "learned" composer. A concert given on Dec. 8, 1813, established the master also in the popular favor. Maelzel, the inventor of the metronome, suggested to the composer the idea of celebrating the downfall of Napoleon after the battle of Leipzig. Thus originated the "Battle Symphony," one of Beethoven's weakest productions, one which he himself later called *eine Dummheit* ('a piece of folly'). This work, together with one of his very greatest, the Seventh Symphony, in A, constituted the programme, and it was the inferior work which roused the audience to a frenzy of enthusiasm, so that four days later the concert had to be repeated. In the following year, 1814, the master's only opera, *Fidelio*—produced originally in 1805 without success—was thoroughly revised. In this new form it was received with storms of applause on May 23, and has maintained a foremost place in the operatic repertoire to this very day. On the occasion of the famous Congress of Vienna, in the fall of 1814, *Fidelio* was chosen as the festival opera in honor of the gathering of the European monarchs (September 26), and on November 29 Beethoven directed a concert of his own works, at which the same potentates were present. Several of them, especially the Empress of Russia, expressed their high esteem of the master by means of very substantial gifts.

The period from 1815 to 1818 is the most unproductive in the composer's life. In November, 1815, Beethoven's brother Karl died, leaving his eight-year-old son to the guardianship of his famous brother. As the mother's reputation was not of the best, Beethoven adopted his nephew and burdened himself with his education. Unfortunately the boy from the very beginning became an endless source of trouble to his great uncle. In order to regain possession of her child the mother instituted a lawsuit, which dragged along, from one court to another, for four years, when the boy finally

was awarded to his uncle. At the same time he was also involved in a lawsuit against the heirs of Count Kinsky, who, after the latter's death, refused to pay their share of the 4000 florins guaranteed to Beethoven in 1809. And behind these petty annoyances there loomed larger and constantly larger the dreadful spectre of total deafness. The only ray of hope in this sad time came in June, 1817. It was an offer from the London Philharmonic Society to write two new symphonies and to come to conduct them personally. The sum offered was £300. Beethoven eagerly accepted. But the worries just described, combined with his weakened physical condition, prevented the fulfillment of the agreement. Nevertheless, the plan was not abandoned. Among the sketches of the year 1817 are some which were later used in the Ninth Symphony. They evidently were intended for one of the symphonies to be written for London. Likewise the projected journey is the theme of various letters as late as 1824, when the Philharmonic Society formally renewed its offer. The only great works written from 1815 to 1819 are the two sonatas for piano, op. 101 and 106, and the two sonatas for piano and cello, op. 102.

The appointment in 1819 of his former pupil, the Archduke Rudolf, as Cardinal Archbishop of Olmutz suggested to Beethoven the idea of writing a festival mass for the occasion of the solemn consecration which was to take place the following year. But the very first number, the *Kyrie*, assumed such colossal proportions that the completion of the work for the intended purpose was out of the question. The score of the *Missa Solemnis* was not finished till towards the end of 1822. Scarcely had the master written the last note, when he was again engrossed by a new work of gigantic scope, the Ninth Symphony. From now on till his death there was no pause in Beethoven's productivity. During these last years were written the three "last" sonatas, op. 109, 110, 111, and the last quartets, op. 127, 130, 131, 132, 133, 135.

About the year 1817 Beethoven's health, which had never been robust, began gradually to decline. If he had had some one who would have taken proper care of him and furnished him the comfort of a well-regulated home, matters might still have been mended. At all times of his life Beethoven had been very irregular about his meals. When absorbed in his work, he would go without food and even sleep for long periods. But even when he found that his health prevented him from undertaking the journey to London, he continued in his irregular habits. After the lawsuit about his nephew had been settled in 1820, troubles were by no means at an end. When the boy grew older, he was nursed by evil companions, and in the fall of 1825 it was discovered that he had been guilty of forgery. The blow was a terrible one, but the magnanimous uncle not only made full restitution and extended a complete pardon, but even kept the young man more closely about him in the hope of saving him. But in vain. Having failed in his examinations, driven to desperation by his creditors, and not daring to disclose the true state of affairs to his uncle, Karl (he was named after his father) made an attempt at suicide in the summer of 1826. He was found with a bullet wound in his head and brought to Beethoven's house. The effect of this catastrophe upon the master is described

by Schindler: "Signs of deepest grief were visible in his bent carriage. The decision and firmness that characterized his every movement were gone. A septuagenarian stood before us." Symptoms of some severe illness made their appearance. After Karl had recovered, it was decided that he should enter the army. Beethoven was all alone. In this extremity his brother Johann came forward. The brothers had never been on good terms, but there was no alternative, and the master accepted his brother's hospitality at the latter's estate at Gneixendorf. Here Beethoven finished the adagio of the quartet, op. 135, his last composition, on Oct. 30, 1826. A quarrel with his brother and sister-in-law put a sudden end to the visit. On a cold, wintry day, December 2, Beethoven returned in an open carriage to his home in Vienna, where he arrived in a state of utter exhaustion. At first the physicians diagnosed the case wrongly, and thus aggravated the malady, which at last was recognized as Bright's disease. With heroic fortitude, without a word of complaint, the master bore his sufferings for three months. On Jan. 3, 1827, when he realized that the end was near, he made his last will according to which his nephew Karl became his sole heir. After his death it was learned that his savings amounted to 20,000 florins. But even in this long agony of death the master's mind was still busy with plans of great works, among them a Tenth Symphony. In March the London Philharmonic Society sent a check for £100, for which the master dictated a letter of thanks on March 18. During a terrific thunderstorm on the afternoon of March 26, 1827, the immortal spirit left its earthly tenement.

Beethoven was never married in spite of the fact that he was richly blessed with the friendship of many noble women. On more than one occasion he seriously entertained the thought of marriage. But invariably the object of his affection belonged to the high aristocracy, and the prejudices of the times prevented the realization of the master's desires. Much romance has been woven about these love affairs, yet even to-day little more is positively known than was known by Dr. Wegele, who wrote in 1838: "Beethoven was never without an affair of the heart, which generally took a deep hold of him. At least as long as I lived in Vienna he always had some love affair, and frequently had made conquests, which, if not impossible, would have proved extremely difficult for many an Adonis."

Beethoven was a passionate lover of nature. The summers he always spent in the open country in the vicinity of Vienna. There he would walk with his sketch book always in his pocket, writing down his ideas as they came to him. These preserved sketch books afford a wonderful insight into the workings of this master mind. The constant erasures and alterations show that he rarely employed his themes in their original form. Some of the most marvelous themes were thus elaborated from rather ordinary original conceptions. These sketches bear testimony to the extreme care of Beethoven's workmanship, as well as to the rigorous self-criticism exercised during actual composition. Naturally such a method of production is somewhat slow, and in consequence the sum total of Beethoven's works is not large when compared to that of some other masters, especially Bach. These considera-

tions have misled several biographers, even Thayer, to attribute to Beethoven a lack of facility both in invention and execution. This charge is most readily disproved by Beethoven's consummate mastery of the free fantasia, which excited the admiration of Mozart, and to which the most famous musicians of Beethoven's own time bear enthusiastic testimony. In art it is not quantity, but quality, that counts. Haydn wrote 104 symphonies, Mozart 40, Beethoven 9. That among Beethoven's works there are some of decidedly inferior quality is largely due to the avarice of his brothers, who sold to publishers, without Beethoven's consent or knowledge, manuscripts that were never intended to be given to the world.

In the works of Beethoven absolute instrumental music has reached its culminating point—a point beyond which further progress seems impossible, not even conceivable. Haydn and Mozart had developed and definitely established the instrumental forms which Beethoven chose as the most fitting vehicle for the expression of his genius. He began exactly where his great predecessors had left off. In following the paths which they had pointed out, it was not only natural, but it became inevitable that the very nature of Beethoven's themes, calling for more extended and complex development because of their wider range, greater depth, and intenser emotionality, should lead to an enormous expansion of these forms, to an increase in the technical apparatus, to more exacting demands upon the mental power and mechanical skill of the executants, to entirely new harmonic and rhythmic combinations. Beethoven did not destroy existing forms. On the contrary, he conclusively proved their high artistic value. By subjecting especially one of them to the severest tests, Beethoven demonstrated that in the hands of a master the sonata form (q.v.) is not a stencil hampering freedom of expression, but a plastic mold adaptable to an infinite variety of content. Beethoven's power of emotional expression is as intense as it is universal. In this respect he far surpasses all his predecessors, even the mighty Bach. By using his art as the subjective expression of his own profound personality Beethoven opened new vistas that presented undreamt-of possibilities in the direction of emotional intensity, and it is in this direction especially that modern music has developed.

In its development the genius of Beethoven shows three distinct phases. The first period extends from 1795 to 1803 and, roughly speaking, comprises the works bearing the opus numbers 1-50. Here the composer still walks in the paths of his predecessors, but by no means as a mere imitator. Even the very earliest works bear the impress of a powerful individuality, and unmistakably foreshadow the wonders that are to come. Already contemporary critics were struck by something new, and complained of excessive thematic development, strange and harsh harmonies, forced rhythms. When he reached the end of this first period, Beethoven had already advanced beyond Haydn and Mozart in some respects, notably in his treatment of transition passages. Before that time it was customary to connect the main sections by simple passage work, often mere scales. Beethoven soon dispensed with such meaningless passages and mere decorative accessories; his transition passages were built up from thematic material. The second period extends from 1803 to 1815,

comprising the works from about op. 53-100. Usually the Third Symphony (Eroica), op. 55, is regarded as ushering in this period. Such passionate, intense accents, such bold syncopations and incisive rhythms, such startling dissonances had not been heard before, not even in Beethoven's music. The advance in emotional intensity from the Second Symphony to the Eroica (written in 1802 and 1803 respectively) is so marked, that the law of natural development, which especially in the case of Beethoven's genius always operated gradually, fails to afford a satisfactory explanation. After a period of utter dejection and hopeless despair, into which he was plunged by the realization of his impending doom of deafness, Beethoven emerged a new man, a superman. Out of that tragic struggle with himself, in the course of which he had sounded the very depths of human anguish, his genius rose purified of all earthly dross, in imposing, awe-inspiring grandeur. Henceforth sublimity is the dominant characteristic of Beethoven's works. His themes are such as imperatively demand broad and extensive development, hence that expansion of the development sections. Here the master shows an amazing skill and inexhaustible fertility in the transformation of his thematic material. Frequently a mere fragment of his theme, a simple rhythmic figure suffices to rear the most marvelous tonal structures. Truly, a creation out of nothing!

The works of the third period extending from 1816 to 1827, and comprising the opus numbers after 100, are characterized by colossal architectonic outline, with the minutest elaboration of details. The extraordinary mastery of thematic development of the second period appears even heightened and carried to the utmost limits of refinement and subtlety. Rhythm in its infinite variety becomes almost an independent factor of emotional expression. When approaching these last works for the first time, the mind is fairly overwhelmed, and almost confused, by this wealth of detail, so that until quite recently many excellent musicians considered these masterpieces, the very summit of instrumental music, as lacking in spontaneity and real inspiration. As a matter of fact, it is only now that the "last Beethoven" is beginning to be understood and appreciated in wider circles.

Beethoven wrote 9 symphonies, in C, op. 21, D, op. 36, E♭, op. 55, B♭, op. 60, C♯, op. 67, F (Pastoral), op. 68, A, op. 92, F, op. 93; D♯, op. 125, 9 overtures, 5 concertos for piano and orchestra, 1 concerto for violin and orchestra, 1 triple concerto for piano, violin, violoncello, and orchestra, 16 string quartets, 3 quintets, 2 sextets, 1 septet, 2 octets, 8 trios for violin, violoncello, and piano, 1 sonata for piano (4 hands), 38 sonatas for piano solo, 10 sonatas for violin and piano, 5 sonatas for violoncello and piano, 1 sonata for horn and piano, 2 fugues for string quartet and quintet respectively, 7 sets of variations for flute and piano, 3 sets for cello and piano, 2 sets for piano (4 hands), 21 sets for piano solo, the opera *Fidelio*, the oratorio *Christus am Ölberg*, incidental music to *Prometheus*, *Die Ruinen von Athen*, *Elmout*, and *König Stephan*, 2 masses in C and D (*Missa Solemnis*), the cantata *Der glorreiche Augenblick*, *Meeresstille und glückliche Fahrt*; an aria, *Ah Perfido!*, 18 canons, 67 songs, 7 books of English, Scotch, Irish, and Welsh songs for violin, violoncello, and piano,

and a considerable number of smaller compositions for piano solo as well as for various combinations of instruments

A critical edition of Beethoven's complete works in 24 volumes was published by Breitkopf and Hartel of Leipzig from 1864 to 1867

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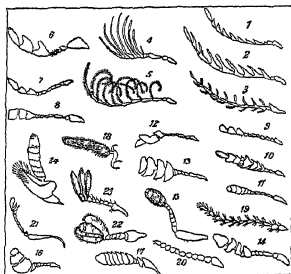
A Beethoven Year Book under the title *Beethoven Forschung*, edited by Th Frimmel, has been published in Vienna since 1911

BEEBLE (AS *bitel*, *bétel*, literally 'biter,' from *bītan*, Eng *bite*) An insect of the order Coleoptera, which seems to be wingless when at rest, but really possesses two pairs of wings. At rest one pair is folded beneath two horny cases that fit over the back and meet in the median dorsal line. These horny cases are the elytra, or wing covers, which are only the modified forewings, and they distinguish beetles from all other insects save the earwigs, which are easily separable upon other grounds

The slight protection afforded by this armature seems to be very advantageous to beetles, for they form the largest order of existing insects "In bodily form," says Dimmock, "the Coleoptera present every variation from long cylindrical to nearly globular, from hemispheres to extremely flattened disks, from straggling ant-like forms to compact seed-like ones" All, nevertheless, exhibit a division of the body into three parts, which, however, are not the typical

head, thorax, and abdomen, but a modification of these—head, prothorax or fore body, and mesothorax and metathorax combined with the abdomen into a hind body

The Head bears various appendages, and the mouth opens forward or downward. The mouth

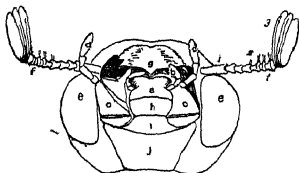


FORMS OF ANTENNAE OF BEETLES

Serrate antennae and modifications 1, serrate (*Ludius*), 2, pectinate (*Corymbites*), 3, bipectinate (*Proconophorus*), 4, Rhabdiate (*Acanthia*), 5, plumose (*Dendroctonus*), 6, 7, 8, irregularly serrate, approaching claviform (clavate antennae), 9, Trogonata, 10, Catoptrichus, 11, Colon, 12, Bryaxis, 13, Anogmus, 14, Liodes, 15, Epimerus, 16, Phymaphora, 17, Heterocerous, 18, Adranes, capillary and verticillate, 19, moniliform (*Dasycerus*) 20, lamellate (*Rhyssodes*), 21, Lucanus, 22, Bolbocerous, 23, irregular (*Lechnosterna*), 24, Dineutus

parts are strong, equally developed, and adapted both for gnawing and for seizing prey. The mandibles are large and strong, and in the males of some forms reach a great size (See STAG BEETLE) The Curculionidae, or snout beetles, have a long beak, but it is a prolongation of the head in front of the eyes, and not of any of the mouth parts

The eyes are compound and usually large and effective, except in a few cave-dwelling species (See CAVE ANIMALS) Ocelli are absent, as a rule, in the adult form, even where possessed by the larva. The compound eyes vary greatly in form and appearance and number of facets,

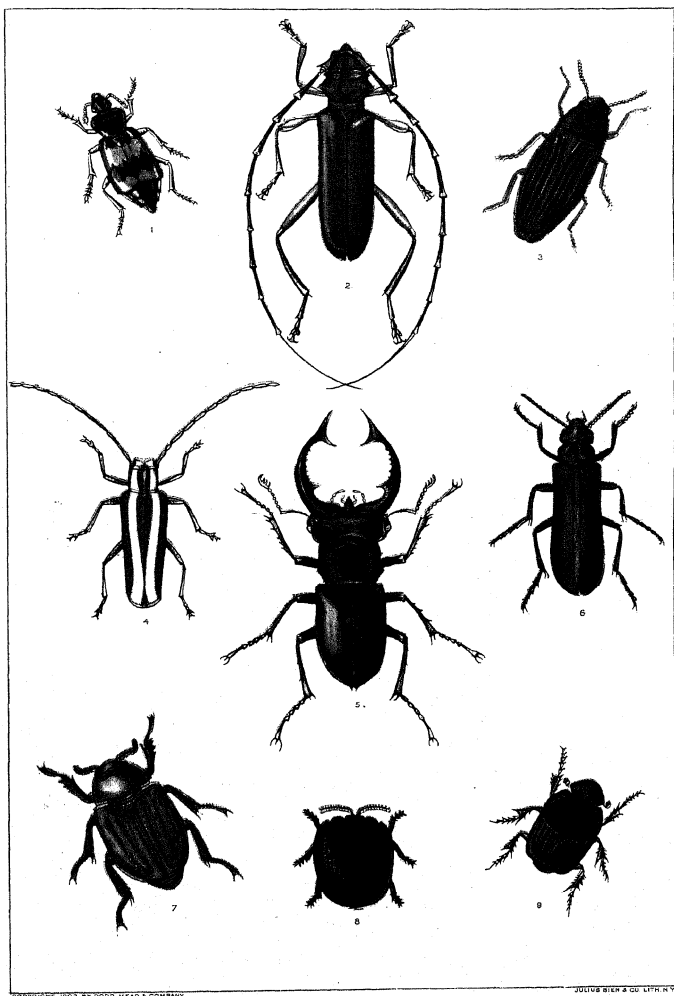


HEAD OF A BEETLE

Arrangement and names of mouth parts a, labrum, b, labial palpus, c, e, maxilla, d, d, maxillary palpi, e, e, eyes, f, f, antennae (1, pedicel, 2, scape, 3, flagellum), g, mandibles, h, mentum, i, submentum, j, gula

and sometimes are divided into upper and lower parts, so that the insect is really four-eyed, this is especially the case in some water beetles, which may thus see what is going on both above and below the surface of the water as they swim. The antennae (most commonly 11-jointed) are placed just in front of the eyes and are

BEETLES



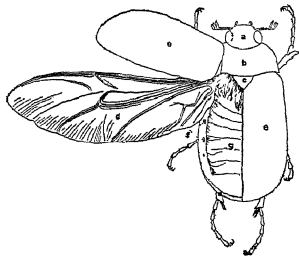
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- | | |
|---|---|
| 1 SPOTTED SEXTON BEETLE - NEOROPHUS GUTTATUS | 5 STAG BEETLE - LUCANUS ELEPHAS |
| 2 SPLENDID LONG-HORN BEETLE - CALLICHROMA SPLENDIDA | 6 NUTTALL'S BLISTER BEETLE - CANTHARIS NUTTALLI |
| 3 STRIPED BUPRESTIS " - BUPRESTIS STRIATA | 7 GREEN AND SILVER " - PHUSIOTUS GLORIOSA |
| 4 APPLE-TREE BORER - SAPERDA CANDIDA | 8 GOLDEN TORTOISE " - COPTOCYCLA BICOLOR |
| 9 DUNG BEETLE - PHANAEUS CARNIPEX | |

ALL SOMEWHAT ENLARGED

organs not only of touch, but of smell and probably of hearing. They appear under a variety of forms, some of which are pretty constant throughout large groups, giving them such names as clavicorn, lamellicorn, serriicorn, longi-



BACK OF A BEEBLE

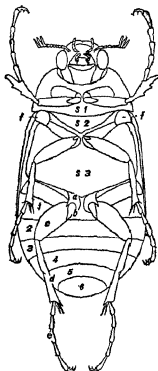
a, head, b, prothorax, c, scutellum of mesothorax, d, a hind wing, e, elytra (front wings), f, spiracles, g, segments of abdomen

corn, etc. "The antennae are said to be clavate when thickened at the extremity, in the form of a club or knob, lamellate, when three or more of the terminal joints spread out in broad processes which lie flat upon one another, serrate, when the joints have on one side short angular processes like the teeth of a saw, pectinate, or comb-like, when the processes are fairly long and stand out nearly at right angles, or flabellate, if the processes are proportionately very long." It is believed that the senses of smell and hearing reside in the antennae. The former is evidently well developed in most, if not all, beetles, while the latter seems certainly possessed by many. The tapping of such species as the "deathwatch" implies a hstener of the same kind, and similar evidence is furnished by the fact that longicorns and some other beetles are often capable of producing sound by stridulating or rubbing together various external hard parts of the body, such as wings and legs, or surfaces and angles on the prothorax and metathorax, they produce some tones that man is incapable of hearing. These organs are possessed chiefly by the males, and a résumé of facts relating to it and to many other characteristics distinguishing the sexes of beetles may be found in chap x of Darwin's *Descent of Man* (London, 2d ed., 1874).

The *Fore Body* forms the second well-marked division of a beetle, and consists of the prothorax, which in Coleoptera is not united solidly with the two other thoracic segments, but connected movably with them. "Its tergite (promotum) is a very prominent feature in all beetles, reaching back to the origin of the elytra." It is hollowed forward to receive the head, and in some groups it is modified in form or possesses horns and spines of extraordinary appearance. These, as a rule, are seen only in the males, however, and most prominently among the lamellicorns. This fore body wears the foremost pair of legs, with which the hinder pairs may or may not agree. Beetles use their legs more than their wings. They do fly, but less frequently and skillfully than they run, jump, climb, swim, and burrow. Most of them are

extremely active and hence have well-developed legs and feet. These are all much alike in the ground runners and tree climbers, but variety is found among those of more special habits and habits. Thus, the jumpers have very long hind legs, with thickened femora, the diggers have thickened fore legs, with claws turned into excavators, the aquatic beetles have all or a part of their legs disposed as oars and made broad and flat and bordered with bristles. The parts of the legs vary considerably and with such regularity that the form of the coxa is used as one of the main standards in classifying families, while larger groups—Pentamera, Tetamera, etc.—are based on number and characteristics of joints in the tarsi. "The tarsal joints are hairy beneath, and those of the anterior (and sometimes also the middle) pair of legs of many male beetles are modified to clasp more firmly the female during copulation." The most peculiar of these modifications is seen among water beetles (Dysticidae). The legs of larvae are often reduced to mere rudiments or are absent.

The *Hind Body* is made up of the two posterior thoracic segments and the abdomen and is entirely hidden from dorsal view in most beetles by the wing covers, but the parts can be well seen on the ventral surface. To the mesothorax are attached the middle pair of legs and the wing covers, while the metathorax supports the hindmost legs and the membranous flying wings, which, when not in use, are curiously folded out of harm's way under the elytra, which also shield the soft-skinned abdomen. The elytra are not instruments of flight, except that they may be useful as balancers, when held out at right angles. They shut close together upon the back when at rest and in some forms are closely

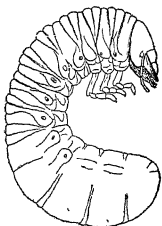


UNDER SIDE OF A BEEBLE

s 1, prosternum, s 2, mesosternum, s 3, metasternum, f, f, epimera of mesothorax, 1, 2, 3, 4, 5, 6, joints of abdomen Joints of hind legs a, coxa, b, trochanter, c, femur, d, tibia, e, tarsus

united by a suture along the median line, or, in the case of certain running beetles, where the wings may be greatly aborted or perhaps may even be altogether absent, particularly in the

female sex, the elytra may even be wholly grown together into one shield. The elytra may be smooth and plainly colored, or may be highly polished, striated, pitted, and sculptured in a great variety of ways, as usually occurs in the terrestrial families. They may also bear spines,



LARVA (GRUB) OF A BEETLE

The legs spring from the three thoracic segments, the remainder of the body consists of abdominal segments

few or many, long and short, tubercles, and other prominences, or be clothed with pubescence or scattered hairs or scales or waxy secretions. "The excessive brilliancy and sparkling coloration of the diamond beetle of Brazil" is due to its being covered with scales, this is common among the weevils (Curculionidae) and not rare in a few other families of Coleoptera. Beetles exhibit almost every known shade of color (see Plate), and a few are iridescent, with beautiful metallic hues. "A little beetle (*Ooptocoryca aurichaloca*), not uncommon on the wild morning-glory (*Convolvulus*), looks, when alive, like a flattened drop of the finest polished gold. The species of certain families resemble one another in coloration and figuration, the leaf beetles (Chrysomelidae) have, for the most part, brilliant coloration, the ladybirds (Coccinellidae) have, for prevailing colors, red, yellow, and black, mostly arranged in round or roundish spots" (Dummock). As a general rule those whose lives are passed in the open sunlight are more bright in color than those that habitually dwell in cavities, under stones or water, or in the dark.

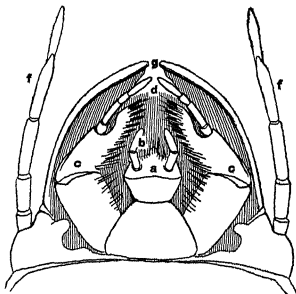
Habits and Food. Beetles dwell in the greatest variety of situations and in nearly all parts of the world. A few live in salt water, more in fresh waters, and a limited number breed in hot springs. Under great stones and in caves dwell a good many blind beetles, the degeneration of the visual organs in some of which has proceeded so far as to include even the optic nerves and lobes. Certain other forms are parasites in other animals or are to be found in the nests of termites and ants, for the very interesting facts of this association, see SYMMIOSIS.

The food of beetles and their young is as diverse as their habitats. A vast number of them, such as Hydrophilidae and Chrysomelidae, feed on vegetable matter, both living and dead, above or below ground. Still another vast host, Cincelidae, Carabidae, Dytiscidae, and Coccinellidae, live on animal food, which either the adults or their predaceous larvae capture alive, or appropriate when found dead, according to the custom of the species. In this fondness for decaying and excrementitious matter, often

minute in quantity, they perform an excellent service.

Enemies and Defenses. Birds, rodents, frogs, toads, and reptiles all prey upon beetles, both adult and larval. Flies, wasps, mites, and predaceous beetles feed on them, or lay eggs within them which develop at the expense of the strength and substance of their host. They are infested with parasitic worms and protozoa, fungi destroy them, and inclement weather and lack of food help to reduce their ranks. Against these adversities various beetles are more or less protected by having a coloration like that of soil, leaves, or the bark of trees, while certain others look like excrescences on the leaves of their food plants, or caterpillars dung and still others hide themselves under heaps of their own frass. A few look like sticks and seeds, the cocoons of one form resembling the seed pod of the food plant. A good many feign death by dropping to the ground. The bombardiers (qv) shoot at a pursuer. The abdomen of a number of beetles is held up in a warning attitude, as if to sting. Certain longcorns have the disagreeable taste and smell of fishies and even possess yellow markings in the region occupied by their luminous disks. For the luminescence characteristic of the Lampyridae see FIREFLIES, LUMINOSITY OF ANIMALS.

Economic Importance. The blister beetles (qv) are used to make blister plasters, particularly the one commonly known as Spanish fly. The grubs of various beetles are roasted and eaten by both white men and natives of the tropics, and the Romans, according to Pliny, fattened certain grubs (*Cossus*) with flour, to prepare them for the table. This *Cossus* was probably a member of the genus *Pronus*, the larvae of which are still eaten in some parts of the world. The hard parts of brilliant tropical species are often mounted as jewels to form pins, cuff buttons, hat pins, belt buckles, and the like. Fireflies sewed in gauze are used by Cuban women to adorn ball dresses. Many beetles, such as those of the ladybird family, prey on



HEAD OF A BEETLE LARVA

a, labrum; b, labial palpus, c, e, maxillæ, d, maxillary palpi, f, f, antennæ, g, mandibles

plant-eating insects; others, such as carrion and dung, and the burying beetles, place their eggs upon stable refuse, and a great many beetles fertilize flowers. Taken as a whole, beetles are economically injurious, for they ravage growing and stored crops, living wood, lumber, both

sawed and manufactured, carpets, furs, hides, woolen goods, cured meats, books, and zoological collections. The Dermestids (q v) are especially pestiferous.

Life History Owing to the difficulty of rearing beetle larvae, we know comparatively little of the life history of beetles. All undergo complete metamorphosis. The eggs are laid in the situations where the economy of the species demands that the grub should be born, in order to maintain itself, i. e., upon or within access of its food. Thus aquatic beetles lay their eggs in the water, leaf eaters upon plants, wood borers beneath the bark and in crevices of timber, the weevils upon tender seed pods or young seeds, and so on. The scarabs (see DUNG BEETLE, SCARAB) roll up their eggs in a ball of dry dung, and the burying beetles place theirs upon the carrion which is buried to await the hatching of the young. When the eggs are not laid so late as to be intended to remain dormant over winter, they hatch quickly, and the larva begins at once to feed upon its intended fare.

The larvae are commonly called "grubs," are usually whitish or of dull, inconspicuous hues, and ordinarily have three pairs of legs, one pair for each of the first three thoracic segments, which may vanish in older stages, but grubs that live within their food may be legless. Grubs may possess traces of still other legs, a number of them having a pseudopod on the posterior end of the abdomen. Like adult beetles, grubs have mandibulate mouth parts, and certain forms have channels in the mandibles through which liquid food is sucked. The larval state lasts for a number of years, which makes those species injurious to agriculture far more formidable than they might otherwise become.

Some beetles pupate in cocoons or cases, made of agglutinated bits of earth and wood. Those larvae that bore in wood go into the pupa stage in their burrows. Some forms pupate in the ground, others on the surface of the ground, while still others, such as the ladybird, suspend themselves to objects above ground by the posterior ends of the body. Several pupate in the last larval skin. The pupal state of the majority of beetles lasts only two or three weeks, but in some cases it lasts several years. On account of the hardness of the exoskeleton, beetles retain their shape well when dried, and hence collections of them are made with more ease than is possible in other departments of entomology, and adult beetles have been studied more than any other order of insects.

Classification. The enormous numbers of beetles do not adequately impress us, since beetles are less on the wing, and hence we see them less than flies, wasps, butterflies, or moths. The form and variation of the external parts are almost wholly used to determine their classification. The present number of described species is not far from 150,000, of which more than 11,000 species inhabit America north of Mexico, representing 83 families. The old subordinal divisions—Clavicornia, Serriicornia, etc.—based on the shape of the antennae, are no longer accepted as scientific, and in their place various subdivisions have been proposed. A commonly accepted classification is the following, based on the tarsi: (1) *Cryptotetramera*—four joints in the tarsus, one rudimentary Coccinellidae and Endomychidae. (2) *Cryptopentamera*—five joints, one being abortive. Chrysomelidae, Cerambycidae (longicorns), Brentidae, Curculionidae, etc. (3)

Heteromera—four front tarsi five-jointed, hind tarsi four-jointed. Meloidae, Stylopidae, Tenebrionidae, etc. (4) *Pentamera*—five-jointed. Ptinidae, Cleridae, Lampyridae, Elateridae, Buprestidae (serriicornis), Scarabaeidae (lamellicorns), Hydrophilidae, etc., including about half of all known beetles.

Many of these, and other families, will be found described elsewhere, in their vocabulary places. See also English names of groups or species, as ROVE BEETLE, FIREFLY, BOMBARDIER BEETLES, STAG BEETLE, GROUND BEETLE, etc.

Bibliography For general works, see INDEX. For the most recent and only general work on the classification of North American Coleoptera, consult Le Conte and Horn, *A Classification of the Coleoptera of North America*, Smithsonian Institution (Washington, 1883). For an excellent general account consult Kellogg, *American Insects*, 1908. A very complete list of the systematic writings on N. A. Coleoptera brought up to 1895 and arranged by families is published under "Bibliographical References in Henshaw's Third Supplement to the Coleoptera, etc." (Philadelphia, 1895). Most of the literature applies to single families, tribes, and genera, and references to important groups will be found mentioned underneath the accounts of these given elsewhere.

BEE/TLESTONE. A hard nodule of clay ironstone composed of shale. It is found at Newhaven, Wales. It is capable of taking a high polish and is therefore used by lapidaries to make ornaments. The name "beetlestone" is from a fossil frequently found in the nucleus of the nodule, the fossil was formerly supposed to be a beetle, but is now known to be a coprolite.

BEETLING (beetle, a heavy wooden mallet, from the root *beat*). A mechanical finishing process applied to linen and afterward to cotton shirting, in imitation of linen, to give the cloth a hard and wiry look, by flattening the yarn irregularly in an angled manner, and also in finishing fine linen damask. This is done by upright wooden stamps, placed close together in a row, with their square butts resting on a roller over which the cloth passes, doubled in a particular way, so that the yarn, when struck, acquires an angled appearance. Linen weft yarn for sailcloth is likewise beetled by such a machine, or by hand hammering on a large flat stone with a wooden mallet, to soften the yarn for easiness of working it in weaving. The yarn is also passed between longitudinally grooved rollers for the same purpose.

BEET PULP A term applied to the mass of sliced sugar beet remaining after the extraction of the sugar. It is a voluminous by-product of beet-sugar factories, and with the growth of the beet-sugar industry the means of utilizing it have received considerable attention. Beet pulp is fed quite extensively to cattle and sheep, and in Europe has been successfully fed to milch cows. Large feeding sheds are erected near the factories in some parts of the United States, several thousand head of steers and sheep being fed upon the beet pulp, supplemented by hay and a little grain. The pulp contains about 90 per cent of water, and in the wet condition must be fed at once or preserved in silos, which may be very crude. It would not pay for hauling any distance. It is also dried at an increasing number of factories and then keeps well and has a feeding value comparable with corn meal. See SUGAR.

BEETS, bāts, NIKOLAAS (1814-1903) A Dutch poet and author, born at Haarlem. He became professor of theology at the University of Utrecht, but is principally known by his contributions to belles lettres. His *Camera Obscura* (1839, 18th ed., 1888), which he published under the pseudonym of Hildebrand, has been called the finest piece of prose in the Dutch literature of the last century. It has been translated into several modern languages. His poetry, though inferior to his prose, enjoyed also great popularity. Among his poetic tales may be mentioned *Guy de Vlaming* (1853) and *Ada van Holland* (1846). His lyric songs include *Korenbloemen* (1853), *Nieuwe gedichten* (1857), *Verstoorde gedichten* (1862), *Harptoonen* (1892). His poetry was published in five volumes (1886-91). He was also the author of some critical essays and several works on theology, among them *Stichtelijke uren* (7 vols., 1848-60).

BEET SUGAR See SUGAR

BEETZ, bāts, WILHELM VON (1822-86) A German physicist, born at Berlin. He was at first professor of physics at the artillery school there. In 1855 he was appointed professor of physics at the University of Bern and in 1858 at the University of Erlangen. He was called to the chair of physics at the Munich Polytechnicum in 1868. He made researches in regard to the electrical conductivity of liquids, galvanic polarization, and other problems, contributed extensively to *Poggendorff's Annalen* and published *Leitfaden der Physik* (2d ed., 1857, 11th ed., 1893), and *Grundzüge der Electricitätslehre* (1878).

BEEVILLE A town, and the county-seat of Bee Co., Tex., 90 miles (direct) southeast of San Antonio, on the San Antonio and Aransas Pass and the Galveston, Harrisburg, and San Antonio railroads (Map Texas, D 5). It has a mild and equable climate, is in a region adapted to fruit and vegetable growing, and exports live stock, cotton, and bee products. Its chief industries include a broom factory and a cottonseed oil mill. Beeville adopted the commission form of government in 1912. Pop., 1910, 3269.

BEFANA, bā-fā'na (It. *Befana*, or *Befania*, corrupted from *Epiphania*, Epiphany) The name given in Italy to a singular custom prevailing on the festival of that name (January 6). According to tradition, the Befana was an old woman who, being busy cleaning the house when the Three Wise Men of the East passed by on their way to offer their treasures to the infant Saviour, excused herself for not going out to see them, on the ground that she would have an opportunity of doing so when they returned. They, however, went home by another way, and the Befana, not knowing this, has ever since been watching for their return. She is supposed to take a great interest in children who on Twelfth Night are put earlier to bed, and a stocking of each is hung before the fire. Shortly the cry "*Ecco la Befana!*" is raised, and the children, who have not gone to sleep, dart out of bed and seize their stockings, in which each finds a present bearing some proportion in value to his conduct during the year. If any one has been conspicuously ill behaved, he finds his stocking full of ashes—the method the Befana takes of expressing her disapprobation. It was also customary in Italy, on Twelfth Night, to carry an effigy called the Befana in procession through the streets amid great re-

joicings, but this, which was probably the relic of the celebration of a Middle-Age "mystery," has fallen greatly into disuse. The word is also used to awe naughty children. See BEAN KING'S FESTIVAL.

BEFORE THE MAST In rigged ships, that part of the upper deck forward of the mainmast used by the enlisted men. Aboard the mainmast the starboard side (in port, at sea, the weather side) of the quarter-deck is kept clear of all persons, except the officer of the deck and the captain, while the port side (at sea, the lee side) is used by the officers as a promenade, etc. This division of the ship at the mainmast gave rise to the expression *before the mast*, which is used in the same sense in the merchant service, where the customs are similar but less formal. Mariners serving before the mast are therefore enlisted men and not officers, both in the navy and in the merchant marine. In modern ships of war the arrangements of decks and masts are so different from those of the old rigged ships that the term "before the mast" has no meaning except as regards its application to the enlisted force, and it has fallen into disuse.

BEG See BEY, BASIŪ

BEGA, bā'ga, CORNELIS (1620-64) A Dutch painter and etcher. He was born in Haarlem and was a pupil of Adrian van Ostade. Like his master, he chose his subjects from low life in its humorous aspects, especially tavern scenes. Among the best of his numerous pictures are the "Peasants' Concert," in the Amsterdam Museum, "The Alchemist," in the Cassel Gallery, "Peasant Family," in the Berlin Museum, and "Rustic Interior," in the Louvre.

BEGARELLI, bā'ga-rlē'le, ANTONIO (c. 1498-1565). An Italian sculptor in terra cotta, the chief master of the Emilian school during the High Renaissance. He was born at Modena, where he studied under local masters and passed most of his life. Chronological reasons as well as the character of his art forbid the assumption that he was a pupil of Guido Mazzoni, as is commonly supposed. Equally erroneous is Vasari's statement that he was greatly influenced by Correggio. He was, however, just as were the painters of the Emilian school, indirectly influenced by Raphael. His sculptures are characterized by a certain nobility of form, a loving care in finish and detail, and a wholesome realism. Most of them no longer possess the beautiful patina, particularly in the flesh tints, for which they once were famous. Their prevailing tone is an ivory white, gilding and color being sparingly used, but the effect has been much impaired by subsequent varnishings. The principal defect of Begarelli's work is lack of composition, for his figures are grouped in the manner of mystery plays. Most of his sculptures are in his native city and the vicinity. To his early period belong a "Pieta" in Santi Agostino, and the almost unknown monument of the Prothonotary Biseotti in San Cesario, and the Presepio in the cathedral (1527). Among the best of his other works are the "Madonna with the Christ Child" in the Galleria Estense, and the "Madonna di Piazzola" in the Museo Civico, the "Descent from the Cross" in San Francesco (his most ambitious effort), a "Pieta" and other works in the Benedictine church of San Pietro, the monks of whose order were his especial patrons. His last years were devoted principally to 32 terra-

cotta statues for the church of San Benedetto Po near Mantua. In these, as in other later works, he was assisted by his nephew, LORENZO BEGARELLI, a sculptor of note, whose works are often confounded with his uncle's, but differ from them in breadth of treatment. Consult the article on the Begarelli by Bagliola in *L'Arte* (1909), and in Thieme and Becker, *Allgemeines Künstler Lexicon*, vol. III (Leipzig, 1909).

BEGAS, b'gas A distinguished family of German painters. The founder, KARL BEGAS (1794-1854), historical and portrait painter, was born at Heinsberg, near Aix-la-Chapelle. After studying with Philippart at Bonn, he entered the studio of Jean Antoine Gros in Paris (1813). Under the patronage of the King of Prussia he received important commissions and in 1821 a royal stipend for study in Italy, where he became an adherent of the "Nazarenes," or German Pre-Raphaelite school. In 1824 he returned to Berlin and became professor in the Royal Academy. Ever influenced by the prevailing fashion, he deserted the Nazarenes for romanticism, and finally became a realist. His best work is his portraits. Among his principal canvases are "Christ on the Mount of Olives" (1818, Garnisonkirche, Berlin), "Outpouring the Holy Spirit" (1821, Cathedral, ib.), "The Resurrection" (1827, Werdersche Kirche, Berlin), "Portrait of Thorvaldsen" (National Gallery, ib.), "Baptism of Christ" (Garnisonkirche, Potsdam), "Lorelei" (1834), "Mohrenwasche" (1843, National Gallery, Berlin). A number of his portraits of distinguished contemporaries (including Jacob Grimm, Meyerbeer, Cornelius, Alexander von Humboldt) are in the Hohenzollern Museum, Berlin.

BEGAS, KARL (the younger) (1845-). A German sculptor, brother of Reinhold Begas, in whose studio, as well as in Rome, he studied sculpture. In Berlin he achieved distinction as a sculptor of extremely graceful groups, such as "Sister and Brother," and others in the National Gallery (Berlin). Dignified in design also are the statues of Knobelsdorff (1886, Vestibule of the Berlin Museum), and of Solon and Aristotle (University of Kiel). Among his other works are the monument commemorating the Franco-Prussian War, unveiled at Cassel in 1898, the two groups representing Margrave Otto IV and Frederick William IV ("Siegesallee," Berlin), an equestrian statue of Emperor William II in the Hall of Fame at Barmen (1902), a "Boar-Hunt" in the Berlin Tiergarten (1905), and the monument in Urville, Elsass, to Empress Auguste Victoria.

BEGAS, OSKAR (1828-83). A German painter, eldest son of the elder Karl Begas. He was born in Berlin, studied with his father, and at 12 painted portraits of merit. In 1852 he won a scholarship which entitled him to a two-years course in Italy. His principal work there, a "Deposition from the Cross" with life-size figures, won him a gold medal and the place of official painter in the Prussian Academy. Among his best-known sitters were Peter von Cornelius (Antwerp Museum), Pauline Lucca, Crown Prince Frederick, General von Moltke, and William I. He also painted mural decorations (Berlin Rathaus), historical and genre pictures, like the "Hour of Gossip" (National Gallery, Berlin), and simple landscapes.

BEGAS, REINHOLD (1831-1911). The most prominent German sculptor of the later nine-

teenth century, second son of Karl Begas. He studied with Wichmann, Schadow, and principally in the atelier of Rauch. At Rome he was much influenced, both in subjects and in realistic tendencies, by his association with Boecklin and by the sculptures of Michelangelo and the Baroque artists. His "Pan Consoling a Deserted Nymph" (1837) was hailed as marking a new conception of sculpture in Germany and was followed by a series of similar subjects. Among the more important commissions of his earlier period are the group surmounting the Berlin Bourse (1850), the monument to Frederick William III at Cologne, the well known Schiller sepulchral monument (modeled in 1874), which won the Grand Prix at the Paris Exposition in 1900. During this period and also throughout his career he modeled a multitude of busts, such as those of William and Alexander von Humboldt, Menzel, Moltke, Bismarck, and a whole series of the Hohenzollern family. The pedestals were of a very original form, usually like that of a classical herm, richly decorated. He was in charge of the many portrait sculptures of the Berlin arsenal, with its Hall of Fame, for which he also executed the colossal statue of "Borussia" (1885) and others, and was, in fact, throughout his career the official sculptor of the Prussian court. Among his other important works are the marble sarcophagus of Frederick II, erected in 1892 in the mausoleum at Potsdam, and a colossal "Fountain of Neptune" (1886-91) supported by titans and surrounded by allegorical figures of rivers, waves, and by fishes and sea monsters—perhaps his masterpiece, and the mighty bronze group "Germania" surmounting the new Reichstag building.

The reign of Emperor William II offered even greater artistic opportunities. Setting aside an official competition, the Emperor himself commissioned Begas to carve the national monument to William I (1892-97), of colossal proportions and with numerous figures. He was also commissioned to erect the monument to Bismarck in front of the Reichstag building (1901), many statues in the Siegesallee of Berlin, and the marble statue of Emperor William II (1904) in the Palace at Potsdam. Begas's sculpture represents the reaction against the enfeebled classic tendencies of his day. It is characterized by a powerful realism and individualism and often by exaggerated action, resembling in this regard, as well as in its decorative qualities, Baroque art, which he revived. It is to his works, as well as to his numerous pupils, that Berlin largely owes its present Baroque appearance. His best productions are those of his middle period, particularly the mythological, genre, and portrait busts.

BEGBIE, HAROLD (1871-). An English author and journalist, born at Farnham St. Martin, Suffolk. He was educated privately and early began the practice of writing. Among his books, largely novels of the didactic type, are *The Political Struggle*, *Master Series* (1889-1901), *The Handy Man* (1900), *The Fall of the Cuckoo* (1901), *Master Workers* (1905), *The Priest* (1906), *The Cage* (1909), *Broken Earthenware* (1909), published in America (1910) as *Twice-Born Men*, and translated into French and published as *Pots Cassés* (1912), *Souls in Action*, which expands the narrative of *Twice-Born Men* (1911); *The Ordinary Man*

and the *Extraordinary Thing* (1912), *Other Sheep* (1912), *The Rising Dawn* (1913)

BEGG, ALEXANDER (1840-97) A Canadian historian, born at Quebec He was educated at Aberdeen, Scotland, and at St John's, P Q He early engaged in commercial pursuits, and in 1867 was the first to arrive at Fort Garry (now Winnipeg) with Canadian-manufactured goods for sale During the half-breed rebellion in 1869 under Louis Riel (qv), Begg sympathized with the discontented and had a considerable share in the successful effort to secure constitutional rights for them He was the first to engage in the steamboat and express-agency business in Manitoba and was active in helping to establish the municipal and commercial institutions of Winnipeg when it was a small town In 1878-84 he was Deputy Treasurer of the province, and shortly afterward went to England as immigration agent for the Canadian Pacific Railway He wrote *Dot It Down* (1871), *The Creation of Manitoba* (1871), *Ten Years in Winnipeg*, with W R Nurey (1879), and a valuable *History of the Northwest*, 3 vols (1894-95) He died in Victoria, B C

BEGG, JAMES (1808-83) A Scottish Free Church leader He was born at New Monkland, Lanarkshire Educated in Glasgow University, he entered the ministry in 1829 At the disruption of the Scottish church he joined the Free church and during the remainder of his life was minister of the church of the Newington, Edinburgh He headed a contingent of Highlanders, who could be counted on to vote against any measure savouring in the least of liberalism in theology or practice He died in Edinburgh Among his works are *A Handbook of Popery* (London, 1832), *Seal Rents Brought to the Test of the Scripture, Law, Reason, and Experience* (Edinburgh, 1838), *The Use of Organs and Other Instruments of Music in Christian Worship Indefensible* (Glasgow, 1866) Consult his *Life* by T Smith (2 vols, Edinburgh, 1885-88).

BEGGA, SAINT See BEGUINES

BEGGAR See MENDICANCY

BEGGAR-MY-NEIGHBOR A game at cards, usually played by two persons, between whom the cards are equally divided Holding their cards with their backs upward, the players lay down a card, alternately, until an honor is played, which is paid for by the adversary—four cards for an ace, three for a king, two for a queen, and one for a knave When such payment is completed, the winner lifts the trick. But if an honor should be laid down during the payment, then the payment of the debt is stopped and transferred to the opposite party, who must pay for that in the same way, and so on, till a full payment is made without an honor In the end one party gets all the cards into his hands and wins the game

BEGGAR'S BUSH, THE The title of a once popular comedy by Fletcher, Rowley, and Massinger (1622) Its source was probably a novel by Cervantes, entitled *Fuerra de la sangre* It has been laid under tribute in *The Royal Merchant* (1707) and *The Merchant of Bruges* (1815) The plot deals with the usurpation of a maiden's throne and her restoration to it by the aid of her lover, a prince disguised as a merchant

BEGGAR'S LICE See HOUNN'S TONGUE

BEGGAR'S OPERA See BALAD OPERA.

BEGGAR TICK See BUT MARGOLD

BEGGAR WEED (so named either because,

it indicates poverty of soil or because it was supposed to be so noxious a weed as to beggar the land) A name applied to a number of species of *Desmodium* which are considered valuable as forage plants or for enriching poor soils when plowed under One of the best known is the Florida beggar weed (*Desmodium molle* or *tortuosum*), which has no superior as forage produced upon light, sandy soils It is an annual leguminous plant, growing 3 to 10 feet high, the height varying with the locality When thinly grown, the stalks are liable to become woody, otherwise a large crop of forage of excellent quality may be obtained in from two to three months Stock of all kinds seem to relish the hay, which has a high nutritive value Yields of from 4 to 6 tons of hay per acre are reported from the Louisiana Experiment Stations Florida beggar weed does well as far north as Virginia, and it has been extensively introduced into the West Indies and elsewhere A number of other species of *Desmodium* are widely distributed, some of which may prove valuable They, in common with other leguminous plants, acquire large quantities of nitrogen from the air through the tubercles found upon their roots

BEGON, begôn', MICHEL (1638-1710) A French administrator and patron of science, born at Blois He entered the French navy, and rose to be Intendant of the West Indies, of Canada, and later of Rochefort and of La Rochelle In recognition of the interest shown by him in the progress of science, the important genus of plants *Begonia* was named for him

BEGONIA A genus of plants of the family Begoniaceæ, the species of which number about 450, and are found in the tropics of both hemispheres, being especially well represented in Mexico and Central and South America Some of the species of *Begonia* are very popular house plants and are extensively grown under the names of begonia, elephant ears, beefsteak geranium, etc, for their handsome flowers and their odd-shaped and often beautiful foliage. The plants are perennial herbs, or, in some cases, shrubby at base, and have root systems of several kinds, upon which schemes of classification have been based Some are tuberous, some have their stems continued into a rhizome, others have a cluster of scale-like bulbs, while still others have fibrous roots Ordinarily the fibrous-rooted species are designated as winter-blooming, the others being summer-blooming, unless especially forced to the contrary The leaves, which are radical, or, if borne upon the stem, alternate in two ranks, are usually unequal-sided, and vary within wide limits in size, outline, and texture. The flowers are monocious, the male usually having four petals, the female five, sometimes two petals. The stamens are quite numerous, the styles two or four, with the stigmas twisted like corkscrews The fruit consists of a winged capsule filled with numerous small seeds, which are without an endosperm.

Begonias may be propagated in a number of ways Their tuberous or bulbous roots may be divided, their stems rooted, or they may be grown directly, either from leaves which are cut and placed in the soil, or from incisions made in the leaf, which lies flat upon the ground The leaves form a callus where cut, from which ultimately arises a number of adventitious buds Horticulturally the begonias may be divided into the following sections fibrous-rooted or

winter-flowering, semi-tuberous or Socotran, tuberous or summer-flowering, and rex or ornamental-leaved varieties. Many cultural varieties and hybrids of each are known to the florist, some of the hybrids being plants of great beauty, as the "Gloire de Lorraine," the double-flowered, and some of the single-flowered tuberous rooted varieties, etc. The "Rex" begonias are of note on account of the remarkable coloration of the leaves in some varieties. They are originally of Asiatic origin and have by crossing and selection yielded many fine forms. The Socotran species have peltate leaves, those of the others being all unequal-sided. The cultivation of begonias was begun about 1777, and there are now hundreds of named varieties of recognized merit. Of rather easy cultivation, they do not seem to withstand the burning summer sun and frequent droughts of the United States, and they grow better as house plants than they do in the open. See Plate of GREENHOUSE PLANTS.

BEG-SHEER, bēg'shēr, or **BET-SHEER**, sometimes also spelled **BEX-SHEER** (named from the city of the same name on its shores, Turk beg, beg + Pers *Shehr*, city) (Map Turkey in Asia, D 4). A fresh-water lake in lat 37° 45' N and long 31° 30' E, in the western part of the province of Koneh, Asiatic Turkey, and supposed to be the ancient *Caraltis*. It is about 20 miles long, and from 5 to 10 miles broad, and is connected by a short stream of the same name with Lake Soghla.

BEGUNES, bâ-gēnz', **BEGUINÆ**, or **BEGUTTE** (ME *begyne*, *byggyn*, OF *béguine*, MI *beguina*, *beghna*, from Lambert le Begue). The name of the earliest of all non-monastic societies of women united for pious purposes, dating from the twelfth century and in all probability founded by Lambert le Bègue (died 1187), a priest of Liège, Belgium. The popular tradition of Brabant since the seventeenth century, that a St Begga, daughter of Pepin, and sister of St Gertrude, founded in 696 the first sisterhood of Begunes at Namur, has no historical basis. An account of their establishment at Vilvorde, near Brussels, is also demonstrably unauthentic. The Begunes were not restricted by vows, nor did they follow the rules of any order, but were united under a *supérieure* for the exercise of piety and benevolence, and lived generally in separate small cottages, which collectively formed the *beguinage*, or 'vineyard,' as it was scripturally termed. Their establishments were often enriched by liberal donations. A church, a hospital, and a house of reception or common entertainment generally belonged to every community of Begunes. The sisters were distinguished from the rest of the laity only by their diligence, devotedness, piety, and charity. Societies of Begunes flourished greatly during the twelfth and thirteenth centuries, when they spread themselves over France and Germany. Among the most important were those in Hamburg, Lubeck, Ratibon, Magdeburg, Leipzig, Goslar, Rochlitz, and Gohlitz. As the pietists of the Middle Ages, the Begunes were often subjected to persecutions by the mendicant orders of friars, but, on account of their practical usefulness, were sheltered by the Pope and Councils as well as by secular authorities. In the thirteenth and fourteenth centuries, the Begunes became united with the persecuted spiritualists among the Franciscans, and with the sect of the 'brethren and sisters of the free spirit.' Hence arose certain heresies, which, of course, occasioned inter-

ference on the part of the Inquisition, and on account of certain immoralities a synod held at Fritzlar required that all candidates must be 40 years old before they could enter a society of Begunes. These sisterhoods maintained their position in Germany and the Netherlands longer than in other countries. In Holland they existed at the close of the eighteenth century, and in the present day we find here and there so-called Begunen-hauser in Germany; but they are now nothing more than almshouses for poor spinsters. In Belgium, at Ghent, there are two extensive Begunages, Le Grand Beguinage de St Elizabeth and Le Petit Beguinage, the former dates from 1234 and was transferred from near the Porte de Bruges to its present site in the northeast of the town in 1874. It contains about 600 sisters, besides 200 *locataires*, or occasional inmates. Their houses form a kind of distinct little town, which, though environed by a wall and a moat, is open to the visits of strangers. Le Petit Beguinage, in a different suburb, contains about 400 members and is also inclosed and has many separate houses. It is conducted similarly. Lace making is one of the industries carried on. There are within the inclosure 13 convents in which the younger sisters live, the older ones live in little houses containing two or four occupants. Living here a life of retirement and piety, the Begunes in their simple dark dresses go out as nurses to the hospital and perform other acts of kindness among the poor. As above stated, they are under no monastic vow, but, having attached themselves to the sisterhood, it is their boast that none is known to have quitted it. Each one pays an entrance fee and yearly board. There are houses of Begunes also at Antwerp, Bruges, Louvain, and Mechlin, and a few in Holland. In 1854 one was established in France, at Castelnauvry, in the department of Aude. Consult Baedeker, *Belgium and Holland*, under "Ghent" (Leipzig, 1910).

Similar societies of laymen appeared in Germany, the Netherlands, and the south of France in the beginning of the thirteenth century, and were known in Germany as *Beghards* (Ger *beghren*, to seek with importunity), in France as *Begunes*, and in Italy as *buachi* and *bocasoti*, but they never obtained the reputation enjoyed by the Begune sisterhood. Towards the end of the thirteenth century they were commonly stigmatized as *dons gargons*, *dons pueri*, 'ministers' men,' 'bede men,' 'pietists,' 'vagabonds'—contemptuous titles, which expressed the low estimation in which they were held. On account of heretics of all sorts retreating into these half-spiritual communities, they were subjected to severe persecutions after 1367, and were gradually dispersed, or joined the orders of Dominicans and Franciscans. In the Netherlands, where they had preserved a better character than elsewhere, they maintained their ground longer, and were protected by Pope Innocent IV (1245), in Brussels by Cardinal Hugo (1254), and in Liège by Pope Urban IV (1261), but their communities disappeared in the fourteenth century. Consult Moshelm, *De Beghards et Begunabus* (Leipzig, 1790), E Hallmann, *Geschichte des Ursprungs der belgischen Beghnen* (1843), Gieseler, *Ecclesiastical History*, vol. III (Edinburgh, 1853).

BEGUM, bâ'gūm or bē'gūm (Hind *bēgām*, Pers *baigim*, lady, from Turk *bey*, lord; prince + possibly Ar *umm*, mother): A title of honor

bestowed upon sultanas, princesses, and other women of high rank in Mohammedan countries

BEHA-EDDIN, bā-ha'ed-dēn' See **BEHAD-DIN**

BEHAIM, bā'hīm, **MARTIN** (1459-1506) A famous German cosmographer. He was born in Nuremberg, of Bohemian descent, and probably received his scientific training from the famous savant Regiomontanus. Taking up a mercantile life, he traveled over Europe, visiting Venice, Mechlin, Antwerp, and Vienna, for purposes of trade, between 1475 and 1479. In 1480 he went to Portugal and began the business of making maps, in which he soon acquired fame and a competency. He was selected to accompany the Portuguese expedition commanded by Diogo Cam, on a voyage of discovery along the western coast of Africa, in 1484-85—an expedition which pushed nearly 20° beyond the best previous exploration, as far as the mouth of the Congo River, but it is very doubtful if he went beyond a part of the distance. In 1486 he visited Fayal, in the Azores, where there was a Flemish colony, and he shortly afterward married the daughter of the Governor of the islands of Fayal and Pico, Jobst von Hurter. He was a member of a commission to discover some practical method of determining a ship's position at sea by means of astronomical observations, and claimed to have rendered important service in this connection to the science of navigation. In 1490 he went back to Nuremberg, where he lived till 1493. During this period he constructed a globe as a gift to his native city, where it is still preserved, being the oldest in existence, but the map is curiously inaccurate even for its day and generation. After another short residence in Fayal he removed to Lisbon, where he died, July 20, 1506. For his biography, consult Murr, *Diplomatische Geschichte des Ritter Martin Behaim* (Gotha, 1801), and for more modern information, *Martin Behaim His Life and his Globe* (London, 1909).

BEHAM, bā'hām The family name of two German painters and engravers of the Renaissance, the most important of the so-called "Little Masters" of Nuremberg. Other forms of the name (Behaim, Beheim, Peham) also occur. The elder brother, **HANS SEBALD** (1500-50), was born at Nuremberg and acquired his art under the influence, if not as a direct pupil, of Albrecht Dürer. In 1525 he was banished from Nuremberg on account of his desic and socialistic views. Although allowed to return late in the same year, he led a wandering life at Ingolstadt, Augsburg, Munich, and elsewhere. In 1528 he was accused of illegally using Dürer's designs and was again banished. About 1531 he removed to Frankfurt, where he passed the remainder of his life. In that year he completed the fine miniatures of two prayer books for Albrecht of Brandenburg, Archbishop of Mayence, now in the libraries of Aschaffenberg and Cassel. Three years later he painted the well-known table now in the Louvre. Among the many illustrations which he designed for the publisher Egenolph in Frankfurt, the most celebrated are those of the *Old Testament* (1533). His excellent drawings are numerous in the principal German collections. He was one of the most prolific German engravers, the latest catalogue of his works (by Pauli, 1901) numbers 1074 woodcuts, 252 engravings on copper, and 18 etchings. He made a specialty of large woodcuts designed for mural decorations, such as "The Military

Pageant in Munich," the "Fountain of Youth," a "March of Soldiers," each over a meter wide. His woodcuts are free and spirited, his line engravings neat and delicate. After 1540 his art declined.

BARTHEL BEHAM (1502-40), born also at Nuremberg, was influenced in his art by his brother rather than by Dürer, as was commonly supposed. Banished from Nuremberg along with his brother in 1525, he settled at Munich and became court painter to Duke William of Bavaria. In 1540 the latter enabled him to visit Italy, where he died unexpectedly. The important paintings formerly ascribed to him at Donaueschingen and Berlin are now known to be the work of a Swabian contemporary, the Master of Messkirch. Among the few that can with certainty be assigned to him are the portraits of Chancellor Eck (1527) in the Weber Collection, Hamburg, Count Palatine Otto Heinrich (1535), the Augsburg Gallery, the "Portrait of a Noble Lady," in private possession, Munich, and 17 portraits of Bavarian dukes in the palace of Schleisheim. His masterpiece, "The Miracle of the Cross" (1530) is now in the Pinakothek, Munich. He ranks highest as an engraver, and in his later works approaches his brother in skill. The latest list of his engravings (Pauli, 1905) numbers 93. More than any other of the "Little Masters" he adopted the style and forms of the Italian Renaissance. Consult Koetschau, *Barthel Beham und der Meister von Messkirch* (Strassburg, 1893), Pauli, "Barthel Beham," in *Mitteilungen der Geschichte für vervelfaltigende Kunst* (Vienna, 1905), id., *Hans Sebald Beham* (Stassburg, 1901), *Studien zur Kunstgeschichte*, vols. cxvii, cxviii (ib., 1911).

BEHAR, bo-hār' (Skt. *vidhāra*, a Buddhist temple or convent.) A division in lower Bengal, British India. At the time of the readjustment of 1912 it was made a part of Behar and Orissa.

BEHAR AND ORISSA The name of a province in lower Bengal, British India (Map India, E 3). It was formed in 1912 and placed under an executive council and Lieutenant Governor in accordance with an announcement made by King George V at the Delhi Durbar, and comprises the Behar, Chota-Nagpur, Turhut, Patna, and Orissa divisions, and the districts of Purnea, Monghyr, Bhagalpur, and Sonthal Parganas in the Bhagalpur division. Roughly it occupies a rectangular tract between the Bay of Bengal and the Himalayas and is bounded on the north by Nepal, on the east by Bengal, on the south by the Bay of Bengal and Madras, and on the north by the Central Provinces and the United Provinces. In the north are the low, flat, alluvial plains of the Ganges, in the south and west are the tablelands of Nagpur and Orissa, and along the shore of the Bay of Bengal is the fertile delta of the Mahanadi River. Rainfall is plentiful, and the principal crop is rice, of which immense quantities are grown. Other products are sugar cane, paddy, maize, pulse, oil seeds, indigo, and the poppy plant. The total area of this new province is between 110,000 and 120,000 square miles, and the population in 1911 was nearly 40,000,000. The capital is Patna (q.v.).

BEHEMOTH (Heb. pl of *Behemah*, beast; as often in Hebrew, the plural indicates a "large beast," the lord of beasts as it were, and not a plurality of animals). An animal mentioned

in Job xl 15-24 There is no doubt that mythological notions are involved in the conception It is grouped (Job xl 25-31) with the Leviathan (q v) Both are described more fully in Ethiopic Enoch ix 7-9, Syriac Baruch, xxix 4, and Fourth Ezra vi 40-52 They clearly represent two primeval monsters The author of Job xl may have borrowed some features from the great beasts infesting the valley of the Nile Even a wholly mythical monster cannot well be described without resort to reality, as the pictorial representations of such beings by Egyptians and Babylonians show Hence Behemoth, 'the colossal beast' of primeval times, occasionally reminds us of a hippopotamus, just as Leviathan, the 'coiled' serpent of the abyss, the earth-encircling ocean, now and then recalls the crocodile Consult Gunkel, *Schöpfung und Chaos* (Göttingen, 1895) and Schmidt, *Messages of the Poets*, pp 200 ff (1911)

BEHISTUN, bā'his-tōon' (Ar, Pers bagh, garden + Pers stan, district, region, Bisutun of the old Persian inscriptions) A ruined town of the Persian province of Irak-Ajemi, 21 miles east of Kermanshah Diodorus Siculus (ii, 13) says that Queen Semiramis, on a journey from Babylon to Ecbatana, encamped here and had her likeness and the likenesses of a hundred of her guard cut into the rock of the mountain that rises at this place This tradition refers to a most remarkable inscription found at the limestone mountain at Behistun, which possesses great historical value The mountain rises to a height of 1700 feet, and the inscription is found at a height of 300 feet, in a position such that it must have been engraved with the aid of scaffolding Although observed by several travelers, it was not until 1835 that it was copied by Sir Henry Rawlinson, after infinite trouble and at great expense The inscription was made by Darius I (c 518 B C) and contains an account of his genealogy and his triumphs It is in cuneiform characters, and trilingual, being written in Babylonian, in Persian, and in Susian Accompanying the text there is an elaborate series of sculptures, representing Darius receiving nine pretenders to the throne, who stand before him with chains about their necks The inscription was cut into the rock with the utmost care and was preserved by a varnish harder than the rock itself After copying the inscription, Rawlinson spent many years in the task of decipherment He published the Persian text in 1846, in the publications of the Royal Asiatic Society, and this publication, with Rawlinson's translation of the inscription, was a most important contribution to the solution of the mystery of Persian cuneiform This accomplished, he and others, notably Westergaard and Norris, set themselves to work on the Babylonian text, and by 1852 the foundations were laid for the reading of the cuneiform inscriptions meanwhile found in Assyria (See ASSYRIA) In an inscription also found on the mountain wall at Behistun, but written only in the Susian language, Darius refers to the fact that he has ordered other inscriptions to be made on bricks and leather, of Jensen in *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, p 237 (1901), King and Thompson, *The Sculptures and Inscription of Darius the Great on the Rock of Behistun*, p 157 (London, 1907) That official copies were taken is shown from a fragment of the Babylonian text published by Weissbach, *Babylonsche Miscellen*,

pp 24 ff (Leipzig, 1903). An official Aramaic version also existed, as we now know from the papyrus fragments discovered on the island of Elephantine and published by Sachau, *Aramäische Papyrus und Ostraka*, pp 185 ff (Leipzig, 1911) The Susian text was first published by Edwin Norris (London, 1853), and later by Oppert, *Le peuple et la langue des Mèdes* (Paris, 1879) For the best publication and translation of the Persian text consult Spiegel, *Die persischen Keilschriften* (2d ed, Leipzig, 1881), Weissbach and Bang, *Die altpersischen Keilschriften* (Leipzig, 1893), of the Babylonian text, Bezold, *Assyrischen Inschriften* (Leipzig, 1882), and of the Susian text, Weissbach, *Die Achämenideninschriften zweiter Art* (Leipzig, 1890)

BEHM, bām, ERNST (1830-84) A German geographer and statistician In 1858 he became assistant editor of the geographical periodical *Petermanns Mitteilungen*, and on the death of Petermann, in 1878, succeeded him as chief editor In 1866 he founded the *Geographisches Jahrbuch*, from which was detached in 1872 the *Bevölkerung der Erde* as a statistical supplement to the *Mitteilungen* From 1876 he took charge of the statistical department of the *Almanach de Gotha* His writings are marked by fullness, accuracy, and lucidity of arrangement

BEHN, bēn, AFRA, or AFRA (1640-89) An English novelist and playwright She was born at Wye, in Kent, the daughter of John Johnson, a barber When a child she sailed to Surinam, South America, with the Lieutenant Governor, whom she was accustomed to speak of as her father Here the young girl made the acquaintance of the celebrated slave Oroonoko, who afterward became the subject of one of her novels, and of a tragedy by Southerne Returning to England, she married a merchant of Dutch extraction named Behn, was presented at court, where her personal appearance and vivacious freedom of manners pleased King Charles II, who deputed her to watch events in Flanders She accordingly went to Antwerp, where she succeeded in discovering the intention of the Dutch to sail up the Thames and Medway, and communicated the secret to the English court, which, however, took no notice of the information—a slight that caused Mrs Behn to throw up state politics in disgust On her return to England she was associated with all the profligate wits, as well as the more staid scholars and poets of the time, and devoted herself to literature Her numerous plays, poems, tales, and letters are disfigured by general impurity of tone and indecency of language, and, in point of intellectual ability, none of her works deserve the high praise lavished on them by Dryden, Cotton, Southerne, and others Of them all, *Oroonoko* is worth perusal It is interesting by reason of its tendency toward realism Mrs Behn was buried in Westminster Abbey Consult her *Works* (London, 1871) and *Anglia* for January, 1902

BEHNESA See BAHNESA

BEHR, bār, WILHELM JOSEPH (1775-1851) A German publicist, born at Sulzheim He studied at Würzburg and Göttingen, and from 1799 to 1821 was professor of constitutional law at the University of Würzburg He subsequently was chosen mayor of Würzburg, but when elected deputy to the Diet, in 1831, the royal sanction of his election was refused On account of his freely expressed political opinions he was convicted of *lèse-majesté* and participation in

political machinations and only with the amnesty of 1848 regained his complete freedom. In the same year he was elected to the German National Assembly. He published *System der Staatskunst* (3 vols, 1810), *Verfassung und Verwaltung des Staats* (2 vols, 1811-12), *Darstellung der Bedürfnisse, Wünsche und Hoffnungen deutscher Nation* (1816), *Von den rechtlichen Grenzen der Einwirkung des Deutschen Bundes* (2d ed, 1820), *Allgemeine Polizeiwissenschaften* (1848).

BEHRAM, bē'ram, or **BEKHRAM**, bēk'-ram See ASSUS

BEHREND, BERNARD ARTHUR (1875-) An American consulting engineer, born in Pomerania, Germany. He was educated by private tutors and at the University and Polytechnic Institute of Berlin. After acting for some time as chief engineer of the Bullock Electric Mfg Co of Cincinnati, he became chief consulting engineer of the Allis Chalmers Co, and advisory engineer of the Westinghouse Co. His services as non-resident lecturer were employed at various times by McGill and Leland Stanford, Jr, universities and the University of Wisconsin. He invented and designed numerous electrical devices and machines and was awarded a gold medal at the St Louis Exposition in 1904. Besides monographs in American and foreign journals on the theory of alternating currents, motors, and generators, his writings include *The Induction Motor Its Theory and Design* (1900), *The Debt of Electrical Engineering to C E L Brown* (1901), *Engineering Education* (1907).

BEHRENS, bē'rens, ADOLPHUS JULIUS FREDERICK (1839-1900) An American Congregational clergyman. He was born at Nimeguen, Holland, emigrated to New Orleans with his parents in 1845, taught school and learned the trade of cabinetmaker, and studied at Denison University and the Rochester Theological Seminary, where he was graduated in 1865. He was pastor of Baptist churches at Yonkers, N Y, and Cleveland, Ohio, but joined the Congregationalists in 1876, and spent seven years as pastor of the Union Congregational Church of Providence, R I. In 1883 he became pastor of the Central Congregational Church in Brooklyn, N Y, where he remained until his death. A forcible thinker and a careful scholar, and of pleasing yet impressive personality, he stood in the foremost rank of American pulpit orators. Among his published works are to be found *Socialism and Christianity* (1886), *The Philosophy of Preaching* (1890), *The World for Christ* (1896), *The Old Testament under Fire* (1897).

BEHRENS, bē'rens, BERTA (1850-1912) A German novelist, who used the pen name W. Heiburg. She completed *Das Eulenhäus*, a posthumous novel by Marlitt in the *Gartenlaube*, in which periodical most of her novels appeared. Among them may be mentioned *Aus dem Leben meiner alten Freundin* (1879, 12th ed, 1908), *Lumpenmüllers Leschen* (1879), *Ihr einziger Bruder* (1882, 15th ed, 1909), *Waldblumen* (1882, 6th ed, 1894), *Trudenss Heirat* (1884), *Dazumal, eight stories* (1887), *Um fremde Schuld* (1895), *Antons Erben* (1898), *Seite Oldenroths Liebe* (1902), *Gesammelte Romane und Novellen* (10 vols, Leipzig, 1894-97), *Dr Danz und seine Frau* (1903), *Wie auch wir vergehen* (1907), *Ueber steinige Wege* (1908), *Der Storkere* (1909), *Famille Lorenz* (1910).

BEHRING, bā'ring or bē'ring See BERING

BEHRING, bā'ring, EMIL ADOLF (1854-) A German physician. He was born at Hantsdorf, Prussia, studied medicine in Berlin, in 1880 became an army surgeon, and in 1894 was appointed a professor at the University of Halle. In 1895 he was called to become director of the Hygienic Institute at Marburg. He was the discoverer of diphtheria antitoxin and attained a great reputation by that means and by his contributions to the study of immunity. At the International Tuberculosis Congress in 1905 he announced that he had discovered "a substance proceeding from the virus of tuberculosis." This substance, which he designated "T C," plays the important part in the immunizing action of Professor Behring's "bovivaccine," which prevents bovine tuberculosis. Among his publications are *Die Blutserumtherapie* (1892), *Bekämpfung der Infektionskrankheiten* (1894), *Beiträge zur experimentellen Therapie* (1900). He received the Nobel prize in medicine in 1901 for his discovery of a diphtheria serum, and in 1913 he announced the discovery of a new diphtheria serum.

BEHRISCH, bā'rish, ERNST WOLFGANG (1738-1809) A teacher and author. He was born near Diesden, and while acting as a private tutor at Leipzig became a friend and boon companion of young Goethe, upon whose early literary ambition he had a restraining influence. Upon his departure from Leipzig in 1767 he was made the subject of three odes by Goethe, who also subsequently referred to him in most friendly terms in *Dichtung und Wahrheit* and in his talks with Eckermann. A number of Goethe's letters to him are to be found in vol vii of the *Goethe-Jahrbuch* (Frankfort, 1886). For his biography, consult Iffossau (Dessau, 1883).

BEIJEREN, bē'er-en, ABRAHAM VAN See BEYEREN, ABRAHAM VAN

BEIJERLAND, bē'er-land An island of the province of South Holland, Netherlands, at the mouth of the Maas or Meuse, 5 miles south of Rotterdam (Map Netherlands, C 3). It is 15.5 miles long and 8.7 miles wide. It is very fertile and produces large quantities of flax.

BEILAN, bā-lān' A small town of Syria, situated a few miles from Alexandretta (qv), near the Beilan Pass, which separates the mountain ranges of Amanus and Rheus and is supposed to be the *Pylæ Syriacæ* (Syrian Gates) of antiquity, probably used by Alexander and the Crusaders (Map Turkey in Asia, G 4). The town is 1330 feet above sea level, has a good climate and an excellent water supply, and is used as a summer resort by the European colony of Alexandretta. Its population is about 5000.

BEILSTEIN, bēl'stēn, FRIEDRICH KONRAD (1838-1905) A Russian chemist, born in St Petersburg. He studied chemistry in Heidelberg, Göttingen, Munich, and Paris, and in 1860 became Wohler's assistant at Göttingen. In 1866 he was made professor of chemistry at the Institute of Technology in St Petersburg. He carried out a number of original investigations in organic and analytical chemistry, and wrote *Anleitung zur qualitativen chemischen Analyse* (Leipzig, 1867, several German editions of this work and translations into other European languages have been published), and *Die chemische Grossindustrie auf der Weltausstellung in Wien 1873* (Leipzig, 1873). Beilstein's *Handbuch der organischen Chemie* (1st ed, Hamburg, 1880-83) is indispensable to the chemical investigator.

and is well known to every student of organic chemistry. A third edition of this voluminous work was begun in 1893, and between 1901 and 1906 a set of five supplementary volumes were published by the German Chemical Society.

BEIRA, bí'ra (Port shore, strand, bank, from Gael, *bior*, water). A province of Portugal, bounded by Spain and the Atlantic on the east and west, respectively, the river Douro on the north, and the provinces of Alentejo and Estremadura on the south (Map Portugal, B 2). Area, 9208 square miles. The coast land is flat, but the elevation gradually rises from the northern frontier, the interior being traversed by a number of mountain chains, not exceeding 7000 feet in their highest summits. The province is drained by a number of small rivers, mostly tributaries of the Douro, and contains many mineral springs. The soil is mostly stony with the exception of the coast land. Agriculture, stock raising, and fishing are the chief industries. The country produces grain, chestnuts, wine, and oil, iron, coal, and salt are mined, and marble is quarried. Manufacturing has been little developed, thread making being the principal industry. Transportation facilities are inadequate, and commerce is insignificant. For administrative purposes Beira is divided into five districts: Aveiro, Viseu, Coimbra, Guarda, and Castello Branco. The city of Coimbra (qv) is the capital. Pop., 1890, 1,450,441, 1900, 1,515,834, 1911, 1,626,484.

BEIRA. A seaport of Portuguese East Africa, about 35 miles northeast of Sofala and 500 miles north of Delagoa Bay (Map Africa, H 6). The harbor is excellent and was visited in 1911 by over 500 vessels of 935,000 tons. Imports in that year were valued at nearly \$3,000,000 and exports at about \$2,625,000. The leading articles of trade are sugar, rubber, wax, tropical fruits, and mining products, which are exported, and iron and cotton manufactured goods, wine, and spirits, which are imported. The importance of Beira is due mainly to the fact that it is the terminus of a railway from the Pungwe River to Umtali on the frontier, thence continuing to Salisbury in southern Rhodesia, a total distance of nearly 400 miles. The present port dates from 1891, although the site is of considerable antiquity. There are no noteworthy features in the town besides the government buildings and the public gardens. Pop., 1911, 3420, of which about 750 are Europeans.

BEIRAM, bí'ram. A Turkish word designating the two great Mohammedan festivals. (1) the lesser Beiram, held for from one to three days at the end of the fasting month, Ramadan, (2) the Greater Beiram, held for four days, 70 days later.

BEIRUT, bá-rōól', or **BEYROUT** (anciently, *Berytus*, Gk βήρυθος, *Bérytos*, the city of wells, from Heb. Ar *beer*, *bir*, well). Capital of the vilayet of the same name in Syria, Asiatic Turkey, and the chief seaport of Syria (Map Turkey in Asia, F 6). It is situated on the coast, on the slopes of the Ras Beirut and St Dimitri, about 90 miles by rail northwest of Damascus. It consists of the old town, ill built and unattractive, and a number of suburbs, with fine streets and houses and many features of a modern city. With its moderate climate and its excellent water supply Beirut is regarded as one of the most healthful cities in Asiatic Turkey. European influence is shown in the numerous business houses, schools and

churches. There are 23 mosques and 38 Christian churches of different denominations, the chief mosque being a former church built by the Crusaders, also numerous educational institutions, maintained chiefly by missions, among which the French are the most influential, their language being almost exclusively that of the Christian population. The city contains also the Syrian Protestant College, an undenominational American institution independent of any missionary society, with faculties of arts and medicine, pharmacy and commerce, and about 1000 students.

The industrial and commercial growth of Beirut has been more rapid than that of any other city of Asiatic Turkey. Silk and cotton fabrics, as well as gold and silver articles, are the chief manufactures. The surrounding region yields large quantities of silk, cotton, and tobacco for export, while the chief imports are food stuffs and articles of apparel. The total value of the imports, in 1910, aggregated \$10,750,000. The harbor is deficient both in size and in depth, and heavier vessels are compelled to anchor outside. Regular steam communication is maintained with Great Britain, Austria-Hungary, and a few other European countries, while the coastwise transportation is effected chiefly by Turkish sailing vessels. Beirut is connected by rail with Damascus, Aleppo, and Tripoli. It is the seat of a pasha, a Greek bishop, a Maronite archbishop, and a papal delegate. The United States has a consular representative. The population is estimated at 120,000, of whom 36,000 are Mohammedans, 77,000 Christians, 2500 Jews, 400 Druses. There are about 4300 Europeans.

Beirut, mentioned in the Tell el-Amarna tablets (qv) as early as the fifteenth century B.C., is the Berytus of the classical writers. Under the Roman emperors it was the seat of a celebrated school of law. In 635 it was conquered by the Arabs, and was besieged and captured by Baldwin I, King of Jerusalem, in 1110. In 1187 it was retaken by Saladin. It soon passed under the power of the Druses (qv), who maintained their control of it until the nineteenth century. In 1840 it was bombarded and taken by the English fleet.

BEISA, bí'sa. A large antelope of Abyssinia (*Oryx beisa*), allied to the gemsbok, but lacking the tuft of hair on the throat. See GEMSBOK, ORYX, and Plate of ANTELOPES.

BEISSEL, bí'sel, JOHANN CONRAD (1690-1768). A German mystic, prominent as the founder of the sect of "Seventh-Day Dunkers" and of the Ephrata Community. He was born at Eberbach in the Palatinate and learned the trade of a baker. He also studied music and became a competent violinist. After he had taken a course in theology at Halle he was banished (in 1720) for holding Pietistic and Inspirational views, emigrated to America, and with a few friends settled in Germantown, Pa. In the following year he became a hermit at Mill Creek, Lancaster Co., Pa., where he remained until 1724, when he returned to Germantown and was there baptized as a Dunker. He soon began to preach doctrines distasteful to the Dunkers, especially with regard to celibacy and the observance of Saturday as Sabbath, and in May, 1725, founded the sect of Seventh-Day Dunkers. He again became a hermit in 1732, this time on the river Cocalico, but his adherents followed him to his retreat, and in 1735 he founded the "Order of the Solitary," and established

the celebrated settlement at Ephrata, Pa. (qv), at whose head he remained until his death. Here he put into practice many of his socialistic, communistic, and religious theories.

He published various collections of hymns, including *The Voice of the Lonely and Forsaken Turtle Dove—that is, of the Christian Church, by a Peaceable Pilgrim Traveling to Tranquil Eternity* (1747), and *Paradisacal Wonder-Play* (1766), which contains the sect's quaint "Brother Song" of 215 stanzas, and its "Sister Song" of 250 stanzas. He was also the author of the first volume of German poetry published in America, *Gottliche Liebes- und Lobestöne* (Philadelphia, 1730). By his fellow religionists he was known as "Friedsam," and the inscription on his tombstone at Ephrata reads: "Here rests an outgrowth of the love of God, 'Friedsam,' a Solitary Brother, afterwards a leader, ruler, teacher of the Solitary and the Congregation of Christ in and around Ephrata." For a partial account of his life, consult the curious *Chronicon Ephratense* (Ephrata, 1786).

BEIT, bāt. An Asiatic word signifying 'house,' 'abode,' or 'place,' the equivalent of which in Hebrew is *beth*. Thus, in Arabic we have *best-al-harām*, 'the house of the sanctuary,' or 'the sacred house,' the name of the central sanctuary at Mecca, and in Hebrew *Beth-el*, 'house of God,' *Beth-abara*, 'place of fords,' etc.

BEITALLAH, bit'al'la (Ar *best*, house + *Allah*, God). The house of Allah, or the Kaaba, at Mecca, also called "the old house" and "the holy house." See **MECCA**, **KAABA**.

BEIT-EL-FAKIH, bit'el-fa'kē (Ar *best*, house + *el*, the + *faqih*, teacher, schoolmaster). A fortified town of Asiatic Turkey, in the vilayet of Hodeida, formerly Yemen, situated about 19 miles from the Red Sea (Map Turkey in Asia, Q 13). It was formerly the chief centre of the coffee trade in Asia and still exports about 12,000,000 pounds annually. Pop., about 8000.

BEITZKE, bits'ke, HEINRICH (1798-1867). A German politician and historian, born at Muttrin (Pomerania). He served as a volunteer in the campaign of 1815, studied at the military schools of Coblenz and Mainz, entered the army as an officer in 1817, and retired in 1845 with the rank of major. In 1858 he was elected to the Prussian Chamber of Deputies. He published *Geschichte der deutschen Freiheitskriege in den Jahren 1813 und 1814* (3 vols., 1855)—an accurate and unprejudiced narrative, widely read, *Geschichte des russischen Kriegs im Jahre 1812* (1856), *Geschichte des Jahres 1815* (2 vols., 1866), *Das preussische Heer vor und nach der Reorganisation* (1867).

BEJA, bā'zhā (the *Paia Julia* of the ancients). A town and seat of a bishopric in the province of Alentejo, Portugal, 36 miles south of Évora (Map Portugal, B 3). It contains an interesting mediæval castle, a cathedral, the notable Church of Our Lady of the Conception, and a Roman aqueduct. Two fairs are held here annually. The city has a considerable trade in the cattle and agricultural products of the fertile region adjacent, and there are also tanneries, potteries, and oil refineries. Pop., 1890, 8394, 1900, 8895.

BEJAN, or **BAJAN** (ML *bejanus*, Fr *bejaune*, *bea jaune*, yellow beak, i.e. unledged bird, sometimes *beanus*, cf Ger *Gelbschnabel*). A name applied to freshmen in mediæval universities and still surviving in Scotland. *Bejaunia*, or payment for "first footing" by stu-

dents on entering the university, was general in the Middle Ages, and was part of a kind of imitative ceremony which included much horse-play and terminated with a banquet. Often there was elected a mock "abbot" of the Bejani. These practices led to so much abuse that they were frequently a subject of university statutes, which, however, tended rather to regulation than to suppression of this form of hazing. For an account of these ceremonies consult Rashdall, *Universities of Europe in the Middle Ages* (Oxford, 1895).

BEJAPORE, be'ja-pōi'. See **BEJAPUR**.

BEJAR, bi'jan. An old town of Spain, in the province of Salamanca, about 45 miles south of the capital of the province (Map Spain, C 2). It is situated on the river Cuervo de Hombro, on a plateau 3185 feet above sea level. Its industrial growth has been very rapid, and the principal manufactures are bread, yarn, thread, cotton and woolen fabrics, ribbons, soap, and bisque. There is considerable trade in wool. The surrounding country is fertile and produces grain, wine, vegetables, and chestnuts. Béjar gives its title to a ducal family, whose ancestral palace within its walls and the churches of San Juan, Santa Maria, and El Salvador are the most pretentious buildings. There are warm sulphur springs in the vicinity. Pop., 1900, 9488, 1910, 9209.

BEJART, bi'zhar'. A family of French comedians of the end of the seventeenth century. They formed part of Molière's troupe. One of them, Armande, was married to Molière in 1662 and embittered his last years by her coquetries. See **MOLIÈRE**.

BEJAS, bi'jaz. Hamitic peoples between the Nile, the Red Sea, Abyssinia, and Upper Egypt. They are tall (1.708 m) and muscular, with black, almost woolly hair. Keane subdivides them into Ababdeh, Bishari, and Taga. See **AFRICA**.

BEKAA, bek'a-a, El (Heb., Ar large valley). The Cœle-Syria of the ancients, the "plain of Lebanon" of the Old Testament. A beautiful and fertile elevated valley of Syria, situated between the nearly parallel ranges of the Lebanon and the Anti-Lebanon Mountains and watered by the Leontes (Litany). It occupies an area about 90 miles long with a greatest width of 20 miles, and is much used for a grazing ground by the Arabs, the banks of the watercourses being very fertile. The name of Cœle-Syria was once applied to the entire southern portion of Syria, embracing Phœnicia and Palestine.

BEKE, bek, CHARLES TILSTONE (1800-74). An English traveler, born at Stepney, Middlesex. He first studied law at Lincoln's Inn and devoted much attention to ancient history, philology, and ethnography. The results of these studies first appeared in his works, *Origines Biblicæ, Researches in Primæval History* (1834). Supported only by private individuals, he joined in Abyssinia the party led by Major Harris and distinguished himself by the exploration of Garam and the countries lying to the south, which were previously almost unknown in Europe. The results of these researches appeared partly in several journals and in *Abyssinia: A Statement of Facts*, etc. (2d ed., London, 1846). After returning to Europe, he published the *Essay on the Nile and its Tributaries* (London, 1847), *On the Sources of the Nile* (1849), *Mémoire justificatif en réhabilitation des pères Paes et Lobo* (1848), and *On the Geographical*

Distribution of the Languages of Abyssinia (1840). In 1861 he made a journey to Harrar and undertook in 1865 a fruitless mission to Abyssinia to obtain the release of British captives. In 1874 Dr Beke started for the region at the head of the Red Sea, where he claimed (though his views are disputed) to have discovered Mount Sinai east of the Gulf of Akabah, and not west, as generally supposed. Other works of his are *British Captives in Abyssinia* (1865), *King Theodore* (1869), *Idol in Horeb* (1871), *Jesus, the Messiah* (1872), *Discoveries of Sinai in Arabia* (published posthumously, 1878).

BÉKÉS, bá'kásh See CSABA

BEKKRAM See ASSUS

BEKKER, bék'kér, ELISABETH (1738-1804) A Dutch author, born at Vlissingen. During the Revolutionary period she lived in France, where she narrowly escaped death by the guillotine. Her chief work is *Histoire van Sara Burgerhart* (2 vols, 1782, 7th ed, 1886). She wrote some poems and a number of stories, marked by elegance of style and by skillful character delineation. These latter include *Histoire van Willem Levend* (8 vols, 1784-85), *Abraham Blankaart* (3 vols, 1787-89), *Connelia Waldschut* (6 vols, 1793-96).

BEKKER, IMMANUEL (1785-1871) A German classical scholar, born in Berlin. He studied at Halle under F. A. Wolf (qv), taking his degree in 1807, in 1811 he was appointed professor of philology at Berlin, where he continued until his death. Bekker's great service to classical philology consisted in his recensions of texts on the basis of new collations of manuscripts, independent of printed editions. His industry was enormous, and he carried on his researches in Germany, France, Italy, and England, examining in all over 400 manuscripts. Among the authors included in his recensions were Plato (for whose text he collated over 30 manuscripts), Aristotle, the Attic orators, Aristophanes, Thucydides, Theognis, Sextus Empiricus, Livy, Tacitus, and others. He was also engaged on the *Corpus Inscriptionum Graecarum*, edited 25 volumes of the *Corpus Scriptorum Byzantinorum*, and published *Anecdota Graeca* (3 vols, Berlin, 1814-21), as well as *Studies in Old French*. Consult Sandys, *A History of Classical Scholarship*, vol. III (Cambridge, 1908).

BEKTASHI See BAKTASHI

BEL One of the chief gods of the Babylonian pantheon. The name, meaning 'lord,' is the title employed by the Akkadians, or Semitic Babylonians, for the great Sumerian deity Enlil or Ellil, whose seat was at Nippur. It is not known what the Sumerian name signified, except that 'En' means 'lord.' His temple in Nippur was called E-kur, or 'mountain house,' and the Akkadians referred to him as *shadu rabu*, or 'great mountain.' Bel was the 'lord of the lands' in distinction from Anu and Ea, whose realms were the sky and the sea. The god of Babylon, Marduk, whose home as the son of Ea originally seems to have been Eridu, was identified with Bel, as Ammon was with Re in Thebes. Both the Hebrews and the Greeks, therefore, speak of Marduk as Bel. Bel was also worshiped by the Assyrians. The wife of Enlil-Bel was Nin-harsag-Belit. The Sumerian name means 'mistress of the mountain,' the Semitic only 'mistress.' Etymologically Bel is closely related to Baal, but in transliterating Syrian names compounded

with Baal the Assyrian scribes wrote Ba'lu or Baalu. Consult Zimmern, *Die Keilschriften und das Alte Testament*, pp. 354 ff (1902), Jeremias, *Das Alte Testament im Lichte des Alten Orients*, p. 95 (1906), Jastrow, *Die Religion Babyloniens und Assyriens* (1902-12, passim).

BÉL, báI, KARL ANDREAS (1717-82) A Hungarian historian, son of Matthias BéI. He was born at Pressburg, and studied at Altdorf, Jena, and Strassburg. In 1843 he became instructor and in 1757 professor of poetry at Leipzig, where he edited the *Acta Eruditiorum* and the *Leipziger Gelehrte Zeitung*. He was subject to melancholia and committed suicide during one of his periods of depression. He wrote *De Vera Origine et Epocha Hunnorum, Avarum, Hungarorum in Pannonia* (1757), *De Maria Hungarica non Rege sed Regina* (1744).

BÉL, MATTHIAS (1684-1749) A Hungarian historian and savant, born at Ocsova. He studied at Halle, was pastor at Neusohl and rector of the Evangelical Lyceum at Pressburg from 1719. He wrote *Hungaria Antiqua et Nova Prodomus* (1723), *Notitia Hungarica Nova Historico-Geographica* (4 vols, 1735-42), *Apparatus ad historiam Hungaricam* (1735-46). His works have proved rich sources of material for subsequent historical workers.

BÉLA, bá'la The name of four Hungarian kings of the dynasty of Arpad.—**BÉLA I** (1061-63) suppressed the last attempts to restore heathenism. By fixing a standard of weights, measures, and coinage he gave a permanent stimulus to the commerce of Hungary.—**BÉLA II** (1131-41), surnamed "the Blind," was greatly influenced by his bloodthirsty wife. At the time of his marriage there was a general slaughter of the advisers in the preceding reign. He managed, however, to live on good terms with the Greek and the German emperors. His death was due to intemperance.—**BÉLA III** (1173-96), grandson of Béla II, was educated at Constantinople and showed a predilection for Byzantine customs and culture, which he introduced into Hungary. He greatly increased the number of religious houses. His second wife was the sister of Philip Augustus of France.—**BÉLA IV** (1235-70), born 1206, was the son of Andrew II, who granted the Golden Bull (qv). His great object was the restriction of the nobles and the restoration of the royal power. He had constant trouble with Frederick II, Duke of Austria. But the greatest danger was from the Tatars, who in 1241 defeated him on the Sajó. Frederick promised aid but gave none, and Béla had to flee. He remained in Dalmatia until the Mongols withdrew, and then returned, making it his especial care to rebuild the ruined villages and to encourage colonization in the devastated parts. He was successful in recruiting his strength, vanquished Frederick at Vienna, and repelled a second Mongolian invasion. He was unsuccessful in war against Ottocar II of Bohemia, who defeated him in 1260. Consult Leger, *History of Austro-Hungary* (Eng. trans, New York, 1889).

BEL AND THE DRAGON The title of a section found in the Greek version of the Book of Daniel (see DEUTERO-CANONICAL BOOKS), but not in the Hebrew or Aramaic text. It contains two stories, which in general are these, though there are variations. (1) That Daniel convinced the King of Babylon of the fraud

practiced upon him by the priests of Bel, who pretended that the god ate at night the feasts regularly set in his temple, by having the floor of the temple covered with fine ashes, unknown to the priests. These came at night as usual, through a secret door, and removed the food, but by morning light their footprints were discovered on the floor. The King in his rage drove away the priests and destroyed the idol of Bel. (2) Daniel killed a dragon that was worshipped by the Babylonians by forcing it to swallow a mixture of pitch, fat, and hair, with the result that it burst. The people in their rage compelled the King to cast Daniel into the lions' den. Thither Habakkuk, the prophet, was carried from his home in Judea with food for Daniel. The King, on finding Daniel still alive on the sixth day, ordered his release and the punishment of his accusers. The original language of these additions to the Book of Daniel is supposed by many scholars to have been Aramaic. Consult Davies, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament* (Oxford, 1913).

BELARIUS In Shakespeare's *Cymbeline*, an exiled nobleman, who in revenge steals the sons of Cymbeline. Having rescued Cymbeline when he was taken prisoner, Belarius becomes reconciled, and the two young princes are restored to their father.

BELASCO, DAVID (1859-) An American playwright and manager. He was born in San Francisco, where he spent most of his boyhood, and began in 1874 as an actor at the Metropolitan Theatre. Showing talent, however, in the adaptation of plays for the local stage, he soon found a wider field. One of his early successes was *Hearts of Oak* (1880), in which he toured with James A. Hearn. He was for a time stage manager of the Madison Square Theatre, New York City, and afterward was connected with the Lyceum Theatre. While there he wrote, in collaboration with Henry C. de Mille, *The Wife* (1887) and *The Charity Ball* (1889), and also, for E. H. Sothern, *Lord Chumley* (1888). In January, 1893, *The Girl I Left Behind Me*, which he wrote with Franklin Fyles, was produced at the Empire Theatre and had great success. In 1895 came *The Heart of Maryland*, a melodrama of the Civil War. Among his other plays are *Zaza* (1898), *May Blossom* (1884), *Men and Women* (1890), *La Belle Russe* (1882), *Valérie* (1886), *Du Barry* (1901), the last suggested at least by Jean Richpin's play of the same name, *Naughty Anthony* (1899), *The Darling of the Gods* (1902), a dramatization of John Luther Long's story, *Madame Butterfly* (1900), *The Girl of the Golden West* (1905), *Adrea* (1904), *The Rose of the Rancho*, in collaboration with R. Walton Trely (1906), *A Grand Army Man*, in collaboration with Pauline Phelps and Marion Short (1907), *The Return of Peter Grimm* (1911). Of late, through his extraordinary skill in training his actors and his minute attention to the mechanical details of lighting and stage setting, he has become better known as a successful producing manager than as a playwright.

BELAY' (probably from Dutch *beleggen*, nautical term of same meaning). A term which signifies to stop. A rope is *belayed* by winding it around a cleat, cavi, bitt, or belaying pin. To prevent the turns from unwinding they are usually put on in figure-of-eight fashion, one

loop around one end of the cleat or pin, the other around the other end.

BELAYING CAVILS are large wooden belaying pins, of rectangular section, but with rounded corners, built permanently into pin rails or life rails. They are intended for ropes too large to be conveniently belayed on pins of the ordinary type, or as friction pins around which large ropes are taken when lowering heavy weights.

BELAYING CLEAT A piece of wood or metal bolted to some part of the structure of a ship for the purpose of belaying ropes. The cleat has two horns around which rope is belayed as about a belaying pin, the section of an ordinary cleat is not unlike a letter H, one side of which is bolted to the ship's structure, leaving the other free for belaying purposes.

BELAYING PIN A short bar of iron, brass, or wood used for the belaying of ropes. The pin varies in length from 10 to 18 inches, and in diameter from three-quarters of an inch to an inch and a half. The pins are put through holes in wooden rails, called pin rails, or life rails, according as they are out at the side of the ship, or inboard, and partly surrounding a mast, and they are prevented from falling out of the rail by a shoulder a little above the middle of their length.

BELBEIS, bel-bas' An Egyptian town situated about 35 miles north-northeast of Cairo (Map Egypt, E 2). It is on the old caravan route from Cairo to Syria and on the railway line connecting Suez with Cairo. Pop., 1897, 11,267. In the vicinity of Belbeis are the ruins of Bubastis (qv).

BELCH, SIR TOBY A rollicking character in Shakespeare's comedy, *Twelfth Night*, who, with Sir Andrew Aguecheek, the clown, and Maria, lead Malvolio, the steward, to believe that the Lady Olivia is in love with him.

BELCHER, SIR EDWARD (1790-1877). An English admiral. He entered the navy in 1812 and in 1816 took part in the bombardment of Algiers. In 1825 he accompanied Captain Beechey on his expedition to Bering Strait. In 1836 he was appointed to the command of the *Sulphur* and for three years was employed in surveying the west coast of America. Returning by the western route, he rendered important services in the Canton River to Lord Gough, whose successes over the Chinese were greatly due to Belcher's soundings and reconnaissances. On his return he published a narrative of the voyage and in 1843 was made a post captain and knighted. In 1852 he was appointed to the command of an expedition sent out by the government to search for Sir John Franklin. He became an admiral in 1872. He published: *Narrative of a Voyage round the World in the "Sulphur" in 1836-42* (1843), *Narrative of the Voyage of the "Samarang" in 1813-46* (1848), *The Last of the Arctic Voyages* (2 vols., 1855).

BELCHER, JONATHAN (1681-1757). A Colonial Governor of Massachusetts and New Hampshire, and afterward of New Jersey. He was born in Cambridge, Mass., graduated at Harvard in 1699, and afterward spent six years in Europe. In 1730 he was appointed Governor of Massachusetts and New Hampshire, but he soon became embroiled in disputes with the Colonial Legislatures concerning the payments of the Governor's salary, questions of Colonial currency, and the protracted boundary dispute between Massachusetts and New Hampshire, and in 1741 was removed, in deference to the popu-

lar outcry against him. He has passed into history as perhaps the most unpopular of all the royal governors of Massachusetts. Some time after his removal he again visited England, where he succeeded in restoring himself to favor, and in 1747 he was appointed to succeed Morris as Governor of New Jersey. His administration of affairs in this province was for the most part wise and satisfactory to the people, and he remained in office until his death. As a Governor, especially in Massachusetts and New Hampshire, he was arbitrary and opinionative, reckless in invective against his opponents, not above the arts of cajolery and flattery, morbidly fond of display, and ostentatiously pious. On the other hand, he was a good administrator and rigidly enforced the laws. In 1756 he gave his library of 400 volumes to the College of New Jersey (now Princeton). Many of Belcher's letters, written between 1730 and 1741, were published in the *New England Historical and Genealogical Register* for 1865, and *The Belcher Papers*, with a biographical preface, were published by the Massachusetts Historical Society in 1893. Consult *Collections of the Massachusetts Historical Society*, vol. vi (Boston, 1893).

BELCHITE, bel-ché'tá. A town in the province of Saragossa, Spain, on the Aguas, a tributary of the Ebro, 25 miles southeast of Saragossa (Map Spain, E 2). It is celebrated as the scene of the battle of June 18, 1809, in which the French under Suchet completely routed the Spaniards under General Blake, capturing all their guns, with a loss of only 40 men to themselves. Pop., 1900, 3333.

BELCİKOWSKI, bel'tsë-kòv'ské, ADAM (1830-1900). A Polish writer, born at Cracow. He graduated in 1865 at the university there, and having taken his Ph.D., was appointed in 1868 instructor in Polish literature at the University of Cracow. He has written much, chiefly drama and literary criticism, his publications including *Adam Tarło* (1869), *Hungary* (1870), *Francesca da Rimini* (1873), *King Bolesław the Bold* (1882), and several essays in *Ze Studyów nad Literaturą Polską*, edited by Chmielowski (1886).

BELCK, WALDEMAR (1862-). A German traveler and archaeologist, born in Danzig. He studied chemistry, in 1884 accompanied the expedition which founded the German West African possessions, and after 1888 became connected as an electro-chemist with various commercial establishments. In 1891, and again with Friedrich Lehmann, in 1898-99, he traveled throughout Armenia, studying the remains of the primitive Turanian civilization, collecting a large number of new inscriptions, and making geographical observations.

BEL'DING. A city in Ionia Co., Mich., 25 miles (direct) northeast of Grand Rapids, on the Pere Marquette Railroad (Map Michigan, D 5). It manufactures silk, refrigerators, shoes, baskets, etc. The water works are owned and operated by the city. Pop., 1900, 3282, 1910, 4119.

BELED-EL-JERID, bël'éd-él-jê-réd'. A general term for a region of North Africa, between Algeria and the Great Desert, east of Morocco. It contains a number of oases, noted for their extensive production of dates.

BELEM, bâ-lên'. A city of Brazil. See PARÁ.

BELEM. A suburb of Lisbon (q.v.).

BELEMNITES, bël'em-nits (Gk. *βέλμων*, *belemmon*, dart, javelin). A genus of dibranchiate

cephalopods of the extinct order Belemnoida, allied to the modern squid. That portion of the shell usually found is the "rostrum," or "guard," a solid, cigar-shaped organ, more or less pointed at one end, and pierced at the other extremity by a conical cavity called the "alveolus." In perfect specimens there fits into this alveolus a conical chambered shell, the "phragmocone," which seems to be homologous with the similarly chambered shell of the Nautiloida and Ammonoidea. This phragmocone, which is provided with a siphuncle, has an initial chamber which closely resembles that of the primitive Ammonoidea, notably the genera *Baculites* and *Mimocoel*, and even more closely the modern dibranchiate genus *Spirula*. Above the phragmocone, and developed as an anterior extension of its dorsal wall, is the "proostracum," a more or less calcified plate that becomes the "pen" in the modern squid and cuttlefish, and which probably served to protect the vital organs and to give rigidity to the forward portion of the body. The entire shell was internal.

Some traces of the soft parts of the animal have been found, so that it has been possible to restore the outline of the body and the form of the fins. The general structure seems to have been quite like that of the modern squid, with its long posteriorly pointed body, provided with fin-like marginal expansions of the mantle. There were 10 arms, and these were furnished with strong horny hooks that assisted the creature to seize its prey. Mandibles, and, most interesting of all, the hardened contents of the ink bag have also been, in a few rare cases, preserved. The belemnites are, together with the Ammonoidea, the most characteristic of Mesozoic fossils, and they are found commonly in rocks of Lower Lias (Jurassic) to Upper Cretaceous age, in Europe, North America, and Asia. A single slab of Liassic rock from Whitby, England, now in the geological collection of the museum in Paris, has about 900 specimens on a surface 20 inches square. Some 350 species are known, and they range in form and size from elongated delicate kinds to short, stout varieties.

Belemnites is one of the earliest-known fossils. It has received many names that have expressed various ideas regarding its form, nature, and origin. The shell is supposed to have been known to Pliny, but the name "belemnites" was first applied to it by George Agricola in 1546. Previous to that time it had been called "*ingurium*," and was supposed to be the urine of a lynx petrified into amber. Popular names were "devil's-finger" and "thunder-stone," and they were used in early times as remedies for nightmare and other maladies. Later naturalists classed them as forms of amber, stalactites, sea-urchin spines, crocodile and fish teeth, and as chambers in which dwelt small marine animals. In 1724 Ehrhardt first recognized their affinity to Nautilus and Spirula. For illustration, see CEPHALOPODA.

BELEN. A town in Valencia Co., N. Mex., on the Rio Grande and at the junction of the El Paso-Albuquerque branch of the Santa Fe system and the New Mexico Eastern Railroad, 30 miles by rail south of Albuquerque (Map New Mexico, C 4). It has a State orphan's home. The Felipe Chaves Mausoleum is one of the most artistic architectural monuments in New Mexico. Belen is the centre of an agricultural community, especially noted for its vine-

yards, and has a large flour mill and railroad shops Pop., 1913 (est.), 2500

BELERIUM An ancient name for Land's End, the southwestern extremity of Cornwall, England, sometimes written **BOLERIUM** The name is of doubtful origin, though sometimes derived from Bellerus, a legendary Cornish giant

BELFAST, bĕl-fast' or bĕl-fast The capital of the province of Ulster, Ireland, a city and a county borough of four parliamentary divisions, within the geographical limits of Antrim and Down counties (Map Ireland, F 2) Belfast is situated on alluvial deposit and reclaimed marsh land at the entrance of the river Lagan into Belfast Lough, 12 miles from the Irish Sea and 113 miles by rail north of Dublin Architecturally the city has hardly kept up with its commercial development, but many squalid districts have been built over with handsome structures and new streets, of which one, the Royal Avenue, is the finest in Belfast Some of the principal streets are traversed by tramways The Lagan, on the north side of which, in county Antrim, the city is mainly situated, is crossed by four bridges, of which the most notable is the Queen's Bridge, widened in 1886 The public buildings include the city hall, which, opened in 1906, was built at a cost of some £300,000 in Donegall Square on the site of the old Linen Hall, the custom house and inland revenue office on Donegall Quay, the post office and the public library (40,000 volumes), art gallery, and museum of antiquities in the Royal Avenue, and the commercial buildings in Waring Street There are several fine banks, especially the Ulster Bank. There are five public parks, and the fine botanical gardens of the Natural History Society occupy 17 acres Of the churches the most notable is the Protestant cathedral in Donegall Street, which occupies the site of the old St. Anne's parish church and whose foundation stone was laid in 1899 The plan is a Latin cross, with a west front of 105 feet and a central tower of 175 feet The educational institutions of Belfast include Campbell College (1892), in the Belmont suburb, Queen's University, succeeding under Act of 1908 the old Queen's College (1849), the Municipal Technical Institute, and the Royal Academical Institution The chief newspaper is the Belfast *News-Letter*, established 1737

With a safe and commodious harbor, Belfast is one of the first-class ports of the United Kingdom There are several great docks and basins and a graving dock, notable are the Alexandra Dock (852 feet long and 31 feet deep) and the York Dock In 1911 the net tonnage of vessels arriving at the port was 3,105,624, and departing 3,248,643 The imports include grain and other raw produce, cotton, flax, and linen yarn, timber, coal, iron and steel, petroleum, sugar, etc As compared with the actual exports, the direct exports to foreign countries are unimportant, as most of the exports go through Liverpool or Glasgow In 1911 imports were valued at \$8,141,488, and direct exports £427,761 for domestic goods and \$856,792 for foreign and colonial The chief exports are linen, whisky, iron ore, aerated waters, and cattle The inland trade is carried on by the Lagan, the Ulster Canal, and several railways The staple manufacture is linen, dating from 1637, the industry rapidly increased after 1830, when machinery was introduced Im-

portant also are flax spinning, weaving, distilling, and the manufacture of rope, tobacco, and aerated waters The shipbuilding industry, producing some of the largest vessels in the world, shows an extraordinary development

Belfast became a city in 1888 and a county borough in 1899 In 1896 the boundaries were extended (to a total area of 16,594 acres, or 14,937 acres exclusive of water), the number of wards was increased from 5 to 15, and the municipal corporation, which since 1840 had consisted of 10 aldermen (one being mayor) and 30 councilors, was increased to 15 aldermen and 45 councilors The city owns the docks, ferries, abattoirs, and the gas and electric plants, maintains a fire department, libraries, museums, and workmen's dwellings, and controls the elementary schools Pop., 1821, 37,000, 1851, 103,000, 1891, 273,000, 1901, 340,180, 1911, 386,947 (the gain over 1901 being 10.8 per cent, as compared with a decrease of 0.1 for the county of Ulster and a decrease of 1.5 per cent for Ireland)

There is some reason to believe that a castle was built here about 1177 and destroyed by Edward Bruce in 1316 By the beginning of the fifteenth century Belfast was only a fishing village with a fortress in control of the house of O'Neill The town was secured by the English by grant in 1571 and in 1613 received a charter from James I During the seventeenth century it suffered rather less than other Irish towns from civil strife and developed notably in population and trade Cotton manufacture was introduced in 1771, and shipbuilding on a large scale began in 1791 The overwhelming numerical strength of the Protestants and the vigor of the Roman Catholic minority have on several occasions made Belfast the scene of riot and bloodshed

Consult Benn, *History of Belfast* (Belfast, 1877), Young, *Historical Notices of Old Belfast* (Belfast, 1896), Munce, *Workmen's Dwellings in Belfast* (1898), Fisher, *Trading Centres of the Empire* Belfast (London, 1901)

BELFAST, bĕl-fast' A city, port of entry, and the county seat of Waldo Co., Me., 30 miles southwest of Bangor, on Penobscot Bay, at the terminus of the Belfast division of the Maine Central Railroad (Map Maine, E 7). There is a good harbor, and the principal industries are the manufacture of shoes, doors, sashes, cigars, fertilizers, clothing, blinds, leather, boards, and sardine and corn canning There are also foundries and machine shops The city has a public library, a theatre and opera house, and several fine lodge and bank buildings Settled by Scotch-Irish in 1770, Belfast was incorporated as a town and named (from Belfast, Ireland) in 1773 It was chartered as a city in 1850 The charter now in force was adopted in 1853 and provides for a mayor, elected annually, and a bicameral city council Pop., 1900, 4616, 1910, 4618 Consult Williamson, *History of the City of Belfast* (Portland, 1877).

BELFORD A character in Samuel Richardson's novel *Clarissa Harlowe*. He and Lovelace agree to excuse in each other every breach of etiquette

BELFORT, bĕl-fôr' (Fr. beau, OF *bel*, beautiful + *fort*, fort, citadel) The capital of the territory of Belfort, France, a town of great strategical importance on the Savoureuse, commanding the Trouée-de-Belfort, a pass between the Vosges and Jura Mountains (Map: France,

N, M 5) It is dominated by a lofty citadel, on a rock 200 feet high. In front of the citadel is carved the "Lion of Belfort," a colossal figure, 36 feet in height and 72 feet long, the work of Bartholdi, commemorating the defense of 1870-71. Belfort has manufactories of machinery and cotton, breweries, and tanyards. There is considerable trade in grain and wines with Switzerland and Germany. The town was ceded to France by Austria in 1648, and was fortified by Vauban. During the war between France and Germany the town maintained a gallant defense against the German troops from Nov 3, 1870, until Feb 16, 1871. It then capitulated with all the honors of war. Belfort has been converted, by the construction of a vast system of new works, into one of the most impregnable fortresses in Europe. Pop, 1891, 25,445, 1901 (commune), 32,567, 1906, 34,640, 1911, 39,371. Consult Bardy, *Etude historique sur Belfort* (Belfort, 1898-1900).

BELFORT, TERRITORY OF A department on the eastern frontier of France (Map France, N, M 6). Area, 235 square miles. Pop, 1896, 88,169, 1901, 91,765, 1911, 101,386. It is named after its capital, and is the remnant of the former department of Haut-Rhin ('Upper Rhine'), the major portion of which was ceded to Germany by the Treaty of Frankfurt in 1871. The climate is variable, and the chief industries are agriculture, pasturing, mining, and the manufacture of iron, cotton, and woolen goods. There is considerable commerce in raw materials, and the products of local industries. Capital, Belfort.

BELFRY (ME *befrey, berfreit*, ML *ber(e)fredus*, MHG *bercfrut*, a watchtower, from *berc*, protection, Ger *beigen*, to cover, hide + *frut*, *fud*, place of security, tower, Ger *Friede*, peace). Originally a wooden movable tower for protecting a besieging force in an attack on a fortification, such as Caesar more than once mentions. Froissart describes one that was employed at the siege of the castle of Breteuil in 1366, and at the siege of Jerusalem, by the Crusaders, one was carried in pieces, put together just beyond bowshot, and then pushed on wheels to a proper position. Such towers sometimes rested on six or eight wheels, and had as many as 15 stories or stages, but the height was usually limited to three or four. They were often covered with rawhides to protect them from boiling oil or grease thrown upon them by the besieged, and there was a hinged drawbridge at the top, which was let down upon the parapet of the wall to assist in landing. The lower stage frequently had a battering-ram, while the others were crowded with archers and slingers. See **FORTIFICATION**.

From this use the word came to be applied to a watchtower, beacon, or bell tower used for alarm and refuge in towns and monasteries, and particularly to the wooden framework from which the bell was hung. In mediæval towns the bell was used not only on special occasions, but regularly, to announce work hours, sunrise and sunset, town gatherings, as well as fire alarms and calls to arms. The bell and belfry thus became the emblems of communal freedom, the most conspicuous belfries were those of the town halls, such as those of Florence and Siena, others were isolated square towers, as at Venice, and Bruges, and this was the primitive form, others were connected with city gates, as in some of the Hanse towns, Bordeaux, etc. In the fourteenth century clocks as well as sundials

were for the first time placed on belfries. The term "belfry" is even more commonly used of the wooden frame for the bell in any bell tower, even any church tower, and it was extended to include that part of the structure containing it, i.e., the upper part of the tower, the bell chamber or bell cage. But it is an error to use *belfry* and *bell tower* or *campanile* as synonymous. The extension of the term "belfry" from civil structures to include religious ones is late and incorrect. See **BELL TOWER**, **CAMPANILE**.

BELFRY OF BRUGES, Fr *pron* bruzh, THE See **LONGFELLOW**.

BELGÆ (Lat nom pl of *Belga*) The northernmost of the three great groups into which the Celtic tribes of ancient Gaul were divided. They occupied the territory between the *Seguana* ('Seine'), *Matrona* ('Marne'), *Mosella* ('Moselle'), *Rhenus* ('Rhine'), and the ocean, comprising the modern Belgium, with parts of Holland and northeastern France. To their south lay the *Celtæ*, or Gauls proper, and to their east the Germans. The chief of their many tribes were the Remi, Bellovacii, Suessiones, and Atrebatæ. The Belgæ had also crossed the Channel and settled in southern Britain, in Kent and Sussex. Caesar came in conflict with the Gallic Belgæ in 57 B.C., and crushed them after a long campaign (Ces B G II, 1-33), but several of the tribes revolted later. In the reorganization of the Empire under Augustus, the Belgæ were included in the province of *Gallia Belgica* on the west of the Rhine from the North Sea to the Lake of Constance. Consult T. Rice Holmes, *Caesar's Conquest of Gaul* (Oxford, 1911), J. Jung, "Geographie von Italien und dem Orhis Romanus," in Müller's *Handbuch der Klassischen Altertumswissenschaft* (Munich, 1897).

BELGAUM, *bêl-goum'* The chief city of a district of the same name in the presidency of Bombay, British India, situated east of the dividing ridge of the West Ghats, nearly 2500 feet above sea level, in lat 15° 50' N, and long 74° 30' E, 42 miles northwest of Dharwar (Map India, B 5). Belgaum possesses a fort, which in 1818 was taken from the Peshwa by the British. The town lies between the fort on the east and the military cantonment. Under its new masters the place has made considerable progress. In 1848 the citizens spontaneously subscribed a considerable sum for the reconstruction of their roads and lanes—a liberality which, besides drawing forth a supplementary grant of public money, roused the emulation of adjacent towns and villages. It has two high schools for the education of native youths, which are supported by the neighboring princes, the British government, and private individuals. The town has manufactures of cotton cloth and a trade in cotton, salt, fish, cor, dates, and coconuts. The average annual rainfall at Belgaum is about 36 inches. Belgaum is one of the principal military stations of the presidency. Pop of town, military cantonment, and suburbs, 1891, 40,700, 1901, 36,878, 1911, 42,623. Area of Belgaum district, 4656 square miles, pop, 1891, 1,013,000, 1901, 994,200, 1911, 943,820.

BELGIAN CONGO See **CONGO**, **BELGIAN**.
BELGIC CONFESSION. A statement of faith based on Calvinistic principles, written in French, formed by Guido de Bres, of Brabant, and others in 1561, and sent to Philip II of Spain to induce him to tolerate the Reformed Faith. It was published in the vernacular in

1562, afterward translated into Dutch and German, and was received as a symbolical book by the synods of Antwerp (1566) and Dort (1619). It is reprinted in French with English translation, in Schaff's *Creed*s, vol. iii, pp 383-436.

BELGIOJOSO, bĕl'jō-yō'sō, CRISTINA, PRINCESS (1808-71) An Italian patriot and author, born at Milan. She did much to assist the Italian patriots in their struggles against Austria. In 1830 she removed to Paris, where she edited the *Gazette Italiana* and the *Ausonia* in behalf of Italian liberation. In 1848 she returned to Italy, spoke in the cause of freedom, and equipped at her own expense a volunteer corps. Exiled upon the capture of Rome by the French (1849), she again returned to Italy in 1861 to found the periodicals *Italia* and *Perseveranza*. Her works include *Souvenirs d'exil* (1850), *Scènes de la vie turque* (1858), *Histoire de la Maison de Savoie* (1860), *Reflexions sur l'état actuel de l'Italie et sur son avenir* (1869).

BELGIUM A constitutional monarchy, one of the smaller European states, situated between lat 49° 30' and 51° 30' N, and long 2° 33' and 6° 0' E. It is bounded by Prussia on the east, France on the south and southwest, the North Sea on the northwest, and the Netherlands on the north. The area and population by provinces, according to the census of Dec 31, 1910, comparative population figures for 1900, and the density per square mile in 1910 are shown in the following table:

Provinces	Sq miles	1900	1910	Density
Antwerp	1,093	819,159	966,677	886.3
Brabant	2,268	1,263,525	1,469,677	1,159.0
West Flanders	1,249	805,236	874,135	699.9
East Flanders	1,168	1,099,971	1,190,335	987.5
Hainaut	1,437	1,142,954	1,232,867	857.9
Lège	1,118	826,175	888,341	794.6
Limburg	860	240,796	275,691	296.4
Luxemburg	1,706	219,210	231,215	135.5
Namur	1,413	346,512	362,546	256.8
Total Belgium	11,372	6,603,548	7,423,784	632.9

The increase during the decade was 10.91 per cent. The excess of births over deaths during that period was 717,563, of immigrants over emigrants, 12,678. Number of inhabitants speaking only French (1910), 2,833,334, Flemish, 3,220,662, German, 31,415, French and Flemish, 871,288, French and German, 74,993, Flemish and German, 8662, the three languages, 52,547, leaving 330,893 speaking none of the three languages, and including children under two years of age, and foreigners of other nationalities.

The population was estimated, Dec 31, 1911, upon the annual official returns at 7,490,411, Dec 31, 1912, 7,571,387.

Topography. The country can be divided into four natural regions. A western strip of coastal lowland spreads inland at its northern extremity so as to occupy the zone between the northern frontier and a broken line connecting the cities of Gand, Brussels, and Maestricht. The marshes of La Campine and the low plains of Flanders are included in this westernmost region. In the last-named province the land becomes so low that in many places dikes must be raised to check the encroachments of the sea. An area of low and broken relief between the valleys of the Meuse and the western basin of the Scheldt, constitutes a second natural region

which comprises nearly all of southern Belgium. The third is formed by the plateau of the Ardennes Mountains in the southeastern section of the country. It is delimited by the Sambre and Meuse rivers. The altitude here rarely exceeds 2000 feet, although a peak 2214 feet in elevation has been determined at Baraque Michel. The heavily exploited Belgian coal fields are found in this district. The elevated plains of Hesbaye belong to a fourth region which includes all of northeastern Belgium.

Climate. Three climatic zones can be distinguished in the country. It is generally mild and rainy along the Atlantic coast. Away from the influence of the ocean, along the German frontier, the humidity is less excessive and the temperature exhibits no great unevenness. Somewhat drier and more rigorous weather prevails in the higher areas. The average temperature in the low districts is about 50° F. The indigenous flora and fauna differ in no important way from that of the rest of north central Europe. See *Flora* and *Fauna*, under EUROPE.

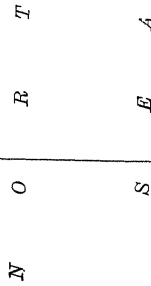
The country is exceedingly well watered, even though its two great rivers, the Meuse and the Scheldt, rise in France and reach the sea in Holland. The navigability of these two water courses and that of their affluents, added to the existence of a well-developed network of canals, has created a large inland waterway traffic.

Geology. The oldest geological formations occur in the southern provinces, particularly along the Ardennes, which are an outlier of the Rhinish Highlands of Germany. Archæan and Silurian rocks occupy very small areas in this region, but the Devonian system is important. On the northern slopes of the Ardennes, from Liège on the east to Mons on the west, Carboniferous strata (carrying valuable deposits of coal) outcrop in considerable extent. The low-lying northern provinces of Belgium are underlain by Mesozoic and Cenozoic sediment, which were deposited in successive order upon the former shore lines and still retain a nearly horizontal position. Cretaceous and Tertiary strata are most widespread in occurrence.

Agriculture. The cultivation of the soil occupies a rather subordinate place in industrial Belgium, owing partly to unfavorable conditions, but mainly to the greater inducements offered to capital and labor by mining and manufactures. There were engaged in agricultural pursuits, in 1846, 24.98 per cent of the population, in 1880, 21.77, in 1895, 18.79—a constantly diminishing number.

As carried on in Belgium, however, agriculture has attained a high degree of perfection. There is a government agricultural board in each province, and the Department of Agriculture has special services devoted to forestry, irrigation, clearing and planting, cultivation, veterinary affairs, and agricultural laboratories. The nature of the surface in the various provinces determines the character of their agriculture. Thus, viticulture is practiced mostly along the valley of the Meuse River, cereal cultivation in the provinces of Antwerp, Brabant, East Flanders, Luxembourg, Namur, and Hainaut, cattle raising on the fertile slopes of the Ardennes and in the rich valleys.

The total area of the country, expressed in hectares (one hectare contains 2.47 acres), is 2,945,104. In the table below will be found the number of hectares in each of the great



divisions of the agricultural domain, according to census returns for three years.

	1866	1880	1895
Under crops	1,966,681	1,983,570	1,916,090
Forest	434,596	489,423	521,495
Uncultivated	262,477	231,964	169,329
Total	2,663,754	2,704,957	2,607,514

The area under main classes of crops is detailed below (in hectares), according to the annual agricultural census, first taken in 1901, and exclusive of enterprises comprehending less than one hectare

	1901	1905	1911
Cereals	743,860	740,193	744,782
Legumes	16,958	13,552	13,575
Industrial plants	95,015	79,271	74,348
Roots	201,219	211,472	232,726
Forage plants	659,767	396,180	386,472
Second crops*	176,194	178,182	189,996

* Short-season crops, sown after a principal crop has been harvested and on the same land

The area under cereals greatly declined during the last 20 years of the nineteenth century, having been 934,663 in 1880 and 809,691 in 1895. Industrial plants, with a decline from 64,150 hectares in 1880 to 51,642 in 1895, show an average improvement in the last decade. The cultivation of sugar beets has increased from 32,627 hectares in 1880 and 54,099 in 1895, to over 60,000 hectares in 1911.

Beet growing is chiefly carried on in the provinces of Brabant and Liège. Potatoes are a leading crop, the acreage devoted to them being slightly greater than that under wheat (160,626 hectares in 1912). Hops and tobacco are extensively grown, and the production of chicory is important.

A glance at the annual agricultural returns will show the yield from areas quoted above, the cereal and root classes in detail, expressed in quintals (1 quintal = 220.46 lbs.)

	1901	1905	1911
Wheat	3,849,652	3,374,980	4,285,238
Spelt	422,853	367,487	385,915
Rye	5,382,053	5,422,904	6,187,558
Barley	1,055,926	983,737	967,732
Oats	5,888,090	4,903,883	6,277,629
Indust. plants	24,340,045	24,032,261	17,715,132
Sugar beets	21,676,047	21,013,336	15,067,332
Forage beets	28,930,616	35,224,114	31,638,805
Potatoes	27,510,021	15,556,119	27,469,946
Forage plants	18,841,317	30,288,909	17,934,805

Under "industrial plants" above, flax is not included. The products of sown meadows are included with "forage plants."

Land Distribution.—The concentration of land-ownership, the relative advantages and chances of survival of small and large farms, and the possibilities in the way of application of capital in agriculture in connection with intensive cultivation, have nowhere perhaps been studied with greater care than in Belgium. As the conditions do not differ much from those in the neighboring countries of western Europe, the agricultural statistics of Belgium are of more than ordinary value. The following table

shows the number of farms at each of the censuses taken during the nineteenth century, and the percentage of increase or decrease from 1880 to 1895

Farms (in acres)	1846	1866	1880	1895	P c
Less than 1½	247,551	312,290	473,471	458,120	-03.2
From 1½ to 3½	70,413	108,084	121,905	85,021	-29.7
" 3½ to 12½	165,983	219,384	226,068	190,833	-15.4
" 12½ to 25	42,737	61,680	48,300	50,065	+01.4
" 25 to 50	26,585	30,696	25,953	28,151	+08.3
" 50 to 125	14,998	19,066	12,186	12,951	+07.9
More than 125	4,333	5,527	3,403	3,584	+05.3
Total	572,550	744,007	910,396	829,625	-09.7

(+) Increase

(-) Decrease

The above table discloses the interesting phenomenon that while the small farms (those with an acreage of less than 12½ acres each) had been increasing in number previous to 1880, and those with a larger acreage decreasing, the tendency has since been reversed, and since 1880 the small farms have been giving place to the larger ones. (The word "large" is applied to a farm in Belgium that would be considered very small indeed in the United States, but in Belgium the intensive system of cultivation makes it possible to apply a comparatively large amount of capital to a small area.) Within the group of small farms the smallest, those of less than 1½ acres in extent, mostly gardens or orchards attached to houses, have decreased only 3 per cent since 1880, while those from 1½ to 2½ acres have decreased nearly 30 per cent, and from 2½ to 12½ acres 15½ per cent. The largest increase took place in the two groups from 25 to 125 acres, viz., 8 per cent. At the same time there has been an increase in the number of tenants cultivating land. In 1846, 54.7 per cent of the total area under farms was cultivated directly by the owners, in 1866 only 50.3 per cent, in 1880 the proportion increased again to 53 per cent to fall in 1895 below one-half of the total, viz., 49.4 per cent. The changes in agriculture which accompanied this concentration of land and increase of tenantry have been partly, as stated above, a gradual abandonment of grain growing (caused to a great extent by the competition of the cheaper American grain) and the substitution of the cultivation of industrial plants, or of stock raising, or of activities partaking more of the industrial than the agricultural character.

Stock Raising.—This industry is extensively carried on, and the animals and animal products not only supply the domestic demand but furnish an important article of export. The dairy industry is especially important—Belgian cheese, and particularly that of Limburg, having a world-wide reputation. The number of stock animals in Belgium is shown as follows

Live Stock	1846	1880	1895	1911
Horses	294,537	271,974	271,527	261,967
Cattle	1,203,891	1,382,815	1,420,970	1,812,191
Hogs	496,564	646,575	1,183,133	1,229,423
Sheep	662,508	365,400	235,722	

As will be seen from the above table, in which the 1911 figures are taken from the report of the Minister of Agriculture, the number of horses has declined and that of cattle and hogs has increased.

The forests are mostly to be found in the south, especially in the provinces of Liège, Namur, and Luxembourg. They furnish but a small part of the wood required for the Belgian industries. The fisheries furnish employment to a few thousand persons, and the value of the deep-sea fish caught annually is not far from \$1,000,000. In 1903 the value of the catch was \$1,305,907.

Mining. The coal mines of Belgium constitute one of the chief sources of its national prosperity. The coal deposits extend through nearly the entire breadth of the country, from west to east, underlying about one-twentieth of its total area, chiefly along the valleys of the Meuse and Sambre. The development of the coal-mining industry is shown in the following table, which gives the number of mines in operation, the area covered (in hectares), the production (in metric tons), and the output value (in thousands of francs).

	No	Ha	Tons	1000 fr
1880	164	142,837	16,886,698	169,880
1890	134	137,661	20,365,960	265,503
1900	118	140,286	23,462,517	408,470
1910	123	168,717	23,916,580	348,877
1911	127	172,069	23,053,540	340,279

Among the minerals found in Belgium are iron, lead, copper, zinc, calamine, alum, peat, marble, limestone, and slate. The value of the products of the metallic mines is not large, and since 1880 the output has constantly declined. The abundance of cheap fuel has led to the establishment of an extensive metallurgical industry, the ores being imported.

Manufactures. The manufacturing industries occupy the majority of the population and are the chief source of the country's wealth. While the development of great enterprises has kept pace with the introduction of modern machinery, the house industries and small private enterprises have not lost ground. The census of Oct. 31, 1896, returns a total of 320,089 separate establishments in active operation. Of these, 305,045 (93 per cent) were individual enterprises, 18,678 (5 per cent) were operated by firms or companies, 1862 (0.5 per cent) by great corporations. The total number of persons engaged in these enterprises (which include mines, furnaces, etc.) was 1,102,244 (837,223 men and 265,021 women). Employed for all purposes in 1880, there were 14,060 steam engines, with a total of 607,142 horse power, in 1900, 22,991 (1,408,941 h p.), 1910, 27,816 (2,671,418), 1911, 27,990 (2,768,727). Private enterprise employed (census of 1896) 628,253 1/2 horse power.

The house industries are largely carried on by members of the family as a mere subsidiary employment. That does not represent, however, the entire extent of the small industry, as a large number of workshops employ two, three, or a few more persons, with little or no machinery.

The textile industry comprehends the manufacture of linen, woolsens, and cottons. Carpets are produced for export, as well as fine laces, lawns, and damasks.

Although the output from the metallic mines is small, the metal industry is highly important, ranking third in the number of people employed, and being next to the textile industry

in the value of its products, the manufacture of iron and steel especially being on a vast scale.

The first half of the following table presents the output in pig iron, manufactured iron, steel (ingots, nails, etc.), zinc ingots, lead, and silver from lead, in metric tons, the second half, the value, in thousands of francs.

	1880 Tons	1900 Tons	1910 Tons	1911 Tons
Pig iron	608,084	1,018,561	1,852,090	2,046,280
Mfd "	493,326	602,144	452,150	421,650
Steel	234,824	1,223,738	4,500,920	4,974,960
Zinc	36,880	119,317	181,745	198,230
Lead	8,204	16,365	40,715	44,808
Silver*		146,548	264,655	252,720
	1000 fr	1000 fr	1000 fr	1000 fr
Pig iron	37,276	91,547	120,161	133,664
Mfd "	33,980	70,091	39,494	37,487
Steel		190,475	652,460	511,241
Zinc	25,802	69,631	103,541	124,009
Lead	3,133	6,078	13,464	15,572
Silver		15,381	27,754	26,689

* In kilograms

From and including 1900, the output of the iron works includes the half-worked and the finished products, the value relates to the finished products only.

There are large ordnance foundries at Liège and Meehlin, and celebrated makers of firearms and machinery in Liège. Among other branches of Belgian industry are nail making at Charlevoix, and the manufacture of tinware, etc., at Liège and in Hainaut, wire and brass at Namur, zinc at Liège, lead and shot at Ghent, and gold and silver wares at Brussels and Ghent. The glass factories are world-renowned, the value of their output in 1900 was 65,912,000 francs. The chief works are in Hainaut, Brabant, and Namur and at Val-Saint-Lambert. Porcelain ware is manufactured at Tournai, Brussels, Ghent, and Mons. Other manufactured products are building material, food products, lumber and woodwork, hides and leather, chemicals, paper, beer, and tobacco. The sugar factories numbered 121 in 1900 (output, 306,076 metric tons), 92 in 1910 (271,282 tons), 89 in 1911 (234,704 tons), the refineries numbered 25 in 1900 (73,883 tons), 22 in 1910 (114,538 tons, including by-products), 21 in 1911 (121,226 tons, including by-products).

Railways. Belgium has a greater railway mileage in proportion to its area than any other country. The first railway was opened for traffic in May, 1835, from Meehlin to Brussels, a distance of 13 miles. During the first few years all railway construction was done by the government, but in 1842 private companies were permitted to enter the field. Most of the private lines, however, were bought out subsequently by the government, that policy being pursued with especial energy since 1897.

The total length of all lines (exclusive of light railways) in operation Dec. 31, 1911, was 2907 miles, of which 2690 were operated by the state and 217 by private companies. The state lines carried during the year 180,840,189 passengers (private lines, 18,049,557). The revenue for the year amounted to 313,292,497 francs (private, 33,909,926 francs) and the expenditure to 210,645,030 (14,151,403). The acci-

dents on all lines resulted in 164 fatalities and 1131 persons injured, from 1835 to Dec 31, 1911, out of a total of 4,108,815,572 passengers carried, 44,284 were killed (0.11 per million), or injured (1.93 per million)

Shipping and Navigation Belgium has a flourishing merchant marine, which is, however, unable to carry more than a fourth of the country's goods. The number of vessels increased from 67, with a tonnage of 30,149 (12 steam, 30,149 tons), in 1870, to 73 of 113,259 tons (steam, 69, of 112,518) in 1900, 104, of 191,132 tons (steam, 99, of 187,730) in 1910. In 1911 the steam vessels numbered 93, of 160,515 tons, and sailing vessels 8, of 5905. In 1911 the vessels entered at the ports of Belgium numbered 11,106, of 15,907,359 aggregate tons, cleared, 11,122, of 15,896,913, in 1910, 10,943, of 15,101,171, and 10,929, of 15,074,061, in 1900, 8619, of 8,500,772, and 8620, of 8,500,772, in 1870, 5868, of 1,575,293, and 5406, of 1,534,013. Over one-half of the entire shipping is carried in British vessels, over one-third is carried in German vessels, and over one-sixth in Belgian vessels. There were, in Belgium, in 1911, 1348 miles of navigable waters (rivers and canals), which float a large commerce, and about one-half of this mileage is contributed by the canals. Practically all the leading towns are connected in this wise. The Scheldt and the Meuse are navigable from France to the sea, and there are 15 other navigable rivers.

Commerce As a manufacturing country, Belgium requires mainly food products and raw materials from abroad in exchange for its manufactures. The chief articles of import include cereals, cotton, wool, flax, metals, chemicals, drugs and resins, mineral substances, lumber, textiles, oilseeds, hides, animals and animal products, coffee, caoutchouc, and machinery, while the chief exports include iron and steel (with manufactured wares), raw textile materials, yarn and thread, coal and coke, glassware, railway cars, machinery, chemicals and dyestuffs, minerals, zinc, cereals, and sugar. The trade development is shown in the following table, in which import and export figures are given for both the general and the special trade, in thousands of francs

	IMPORTS		EXPORTS	
	Gen	Spec	Gen	Spec
1840	246,400	205,600	183,500	139,600
1860	923,200	516,500	878,200	469,400
1880	2,710,400	1,680,900	2,225,200	1,216,700
1900	3,694,400	2,215,800	3,297,500	1,922,900
1910	6,551,700	4,265,000	5,694,800	3,407,400
1911	6,806,400	4,508,500	5,879,300	3,580,300

In the general trade, since and including 1900, is included the value of uncut diamonds imported (40,000,000 francs in 1900, 97,869,000 francs in 1910, 98,356,000 in 1911), and of cut (but unmounted) diamonds exported (43,000,000 francs in 1900, 98,450,000 francs in 1910, 99,049,000 francs in 1911). In 1911 imports and exports (general trade) by sea were valued at 3,261,700,000 and 2,551,500,000 francs, respectively, by land and railways, 2,918,000,000, and 2,552,300,000, by rivers and canals, 626,700,000, and 775,500,000. In the totals for

the special trade are included, from and including 1900, imports and exports of bulk and specie, amounting in 1900 to 46,543,830 and 15,429,015 francs, respectively, in 1910, to 199,841,769 and 76,139,441, in 1911, to 197,009,667 and 44,548,100.

An interesting feature of Belgium's commerce is the excess of its imports over its exports—a condition which has not changed since 1840. Far from being a drawback to the country, this adverse balance of trade has been one result of Belgium's commercial and financial expansion. The investments of Belgian capital abroad, especially in Russia and in Asia, are unusually large, and the surplus imports represent the materialized profits of foreign investments accruing to Belgian capitalists.

A table follows showing some of the principal articles imported for home consumption and exports of domestic produce in the 1911 trade, values in thousands of francs

Imports	1000 fr	Exports	1000 fr
Cereals*	698,200	Woolens	346,700
Wool	382,500	Iron and steel	287,100
Hides	192,200	Machinery†	221,700
Seeds	187,200	Cereals*	206,800
Cotton	170,500	Hides	151,100
Timber	161,400	Zinc	112,000
Chemical prods	127,700	Seeds	111,400
Rubber	125,400	Flax	109,400
Iron and steel	106,800	Linen thread	103,800
Resins, etc	104,300	Diamonds‡	99,000
Diamonds†	98,400	Glassware	97,800
Flax	97,200	Cottons	79,200

* Including flour † Cut ‡ Including vehicles § Uncut

The principal countries of origin and destination in the order of greatest import values are as follows, year, 1911, values in millions of francs

	Imps	Exps		Imps	Exps
Germany*	602.1	959.1	Argentina	272.3	83.7
France	557.2	659.2	Brit India	267.6	35.0
Great Britain	433.7	476.1	Rumania	245.2	23.3
U States	341.4	114.0	Australia	192.2	27.7
Russia	318.1	66.9	Chile	80.6	20.9
Netherlands	297.9	352.1	Belg Congo	57.6	25.9

* The German Customs Union

The following table shows the course of the Belgian-American trade, from American returns, the value of the exports from the United States into Belgium and the imports into the United States from Belgium being expressed in thousands of dollars

Year	Ex fr U S	Imp to U S	Year	Ex fr U S	Imp to U S
1891	27,500	10,900	1902	46,271	16,522
1892	48,800	10,800	1903	47,073	22,766
1893	26,700	11,200	1904	40,841	23,232
1894	28,400	8,600	1905	38,461	25,923
1895	25,200	10,100	1906	50,000	28,400
1896	27,100	13,800	1907	51,500	30,100
1897	33,100	14,100	1908	53,000	19,000
1898	47,600	8,700	1909	45,100	27,400
1899	44,200	10,600	1910	41,100	40,000
1900	48,300	12,900	1911	46,000	37,100
1901	49,389	14,601	1912	51,400	41,700

Banking. The banking system of Belgium centres in the National Bank, established in 1850 with a capital of \$5,000,000, increased to \$10,000,000 in 1872, when its charter was renewed until 1903. In 1900 its charter was extended to January, 1929. It is the sole bank of issue in the country and in addition to doing a general deposit and discount business with private individuals, serves as a repository of state moneys and has general charge of all the operations of the state treasury. The services to the state are performed free of charge, and in addition a certain amount is paid to the state annually for the privilege of handling its moneys. The bank has numerous branches throughout the country. It also conducts, free of charge, all the financial operations of the State Savings and Pension Institution, established in 1865. There are, in addition, several private banks and banking institutions, the oldest of which is the *Société générale pour favoriser l'industrie nationale*.

Finance. The franc (1 franc = 19.3 cents) is the unit of value. The following table shows ordinary (A) and extraordinary (B) revenue and expenditure for comparative years, in thousands of francs.

	1835	1870	1900	1909	1910
Rev. A	89,171	190,537	494,106	645,107	682,487
" B	1,904	14,905	48,672	150,109	132,918
Total	91,075	205,442	542,778	795,216	815,405
Expend. A	85,614	191,844	479,056	634,450	672,954
" B	1,490	25,064	95,102	151,747	156,502
Total	87,104	216,908	574,158	786,197	829,456

The deficit is really much larger than it appears, owing to the fact that the revenues include the amounts raised by loans in order to meet or reduce the deficits from year to year. The estimated revenue for 1912 was 703,882,584 francs, and the estimated expenditure was 708,080,500 francs.

Belgium has a system of taxation which is burdensome to the masses of the population. In 1854 the direct taxes constituted 25 per cent of the revenue of the state, and the indirect, 28 per cent. In 1901 the proportion of direct taxes fell to about 10 per cent, while that of the indirect taxes rose to about 35 per cent. The chief sources of direct taxation are property taxes, personal taxes, taxes on trades, etc., the most important indirect taxes are import duties, and excise duties on whisky, beer, vinegar, tobacco, and sugar.

In addition to taxation, revenues are derived from state domains and forests, state railways, telegraph, post office, and other government institutions conducted on a business basis. The largest item of expenditure, next to that on railways, posts, telegraphs, and telephones—which need not be considered here, as they are more in the nature of a profitable investment than a source of expense to the state—is the service of the public debt. Of the ministries, that of War draws most heavily on the treasury.

Public Debt.—Most of Belgium's debt has been incurred for profitable undertakings, especially in connection with her railway enterprises. The national debt has grown as follows, in francs

	Consolidated	Floating	Total
1840	255,831,120	24,104,000	279,935,120
1850	611,922,361	14,586,500	626,578,861
1860	634,137,847		634,137,847
1870	682,880,914		682,880,914
1880	1,422,814,049		1,422,814,049
1890	1,998,043,774	20,000,000	2,018,043,774
1900	2,650,888,151	57,651,000	2,708,539,151
1910	3,703,403,893	136,204,500	3,839,608,393
1911	3,734,354,038	201,565,500	3,935,919,538

The debt charge amounted to 186,588,127 francs in 1910.

Population. Belgium is the most densely peopled country in Europe, the average population in 1910 about 653 per square mile. The density of population for each province has been shown in the first table of this article.

The increase of the population may be seen from the following figures obtained by successive general censuses, with per cent of increase during the periods cited.

Year	Population	Increase	Increase p c
1846	4,337,196		
1856	4,529,660	192,464	4.44
1866	4,827,833	298,273	6.50
1880	5,520,000	692,176	14.34
1890	6,069,321	549,321	9.95
1900	6,693,548	624,227	10.28
1910	7,423,794	730,236	10.91
1911*	7,490,411	66,627	0.90

* Estimate

As in all well-settled countries, there is a surplus of women over men, the Belgian figures for 1910 being 3,680,790 men and 3,742,994 women. Of the total population, 2,833,334 were returned by the 1910 census as speaking French only, 3,220,662 Flemish only, and 31,415 German only, 871,228 French and Flemish, 74,993 French and German, 8652 Flemish and German, 52,517 the three languages, 330,893 persons spoke none of these languages. There are four cities with a population exceeding 100,000: Brussels, Antwerp, Liège, and Ghent.

Immigration and Emigration.—Belgium presents an exception among the countries of western Europe in that it has a greater immigration than emigration. The following table shows the annual average of the two movements for four decades and the number of immigrants and emigrants in 1911.

Years	Immigration	Emigration	Excess
1871-1880	15,409	11,472	4,027
1881-1890	19,207	17,698	1,509
1891-1900	24,667	21,304	3,363
1901-1910	36,425	29,482	6,943
1911	41,062	33,007	8,055

Immigration is greatest from France, Germany, and the Netherlands, the three countries averaging together about 90 per cent of the total. Curiously enough, emigration is distributed in about the same proportions among the same countries, only an insignificant proportion (about 2 per cent) going to the United States; all of which shows that the character of the emigration movement in Belgium is quite different from that in the countries of Ger-

many, Austria, Italy, and the United Kingdom. The emigration from Belgium is evidently of a temporary nature, the people going to and coming from the three neighboring countries mentioned as their interests require, but evidently not changing permanently their place of abode.

Religion. With the exception of some 30,000 Protestants and about 13,000 Jews, the people of Belgium are Roman Catholics. Religious liberty is untrammelled. The church must derive most of its material support from the people. The state, however, grants some subventions to the ecclesiastical orders. The country is divided into the six Roman Catholic dioceses of Mechlin, Bruges, Ghent, Tournai, Namur, and Liège.

Education. The percentage of persons 8 years old and over who could read and write was 69.04 in 1880, 73.95 in 1890, 80.88 in 1900, and 86.90 in 1910. The educational system includes secular institutions supported by the state or the local governments, and schools maintained and managed by the Roman Catholic priesthood. The efforts of the clergy to obtain control of popular education have been a principal feature of Belgian politics for a number of decades. The constitution of 1831 totally separated church from state, but conceded to the Catholic clergy as representatives of what was practically the only faith in Belgium the right of imparting religious instruction in the public schools, the Liberal party, abetted by the growing Socialist party, has made repeated efforts to do away with religious teachings in the schools and to substitute purely secular education. Higher education is provided for by the state universities at Ghent and Liège, and the free universities of Brussels and Louvain, all of which give courses in law, medicine, philosophy, and science, and at Louvain instruction is given in Catholic theology. Annexed to the universities are schools of engineering, manufactures, arts, and mines. In addition there are a large number of normal, commercial, and industrial schools, the Royal Academy of Fine Arts at Antwerp, and schools of design and music. The secondary schools include the royal atheneums and the high schools, which are supported and controlled by the government, the number of institutions of secondary learning which are under the independent control of the clergy is probably equal to the number of state schools. Primary education is left to the care of the communes, in every one of which there must be at least one elementary school, the state and the provinces, however, subsidize the communal schools and exercise the right of inspection. At the end of 1911 the primary schools for children were attended by 934,330 pupils, the infant schools by 275,911, and the primary schools for adults by 246,292.

Government. The government of Belgium is a "constitutional, representative, and hereditary monarchy," based on the constitution of 1831, which guarantees to the citizen equality before the law, personal liberty and security, the right of association and petition, and the freedom of worship, instruction, and the press. The crown is hereditary in the direct male line, and on the failure of male issue the monarch, with the consent of the chambers, appoints his successor. The king is commander in chief of the army, concludes treaties of war and peace, nominates officials, and issues decrees, but has no power

to suspend the execution of the laws. He rules through a council of ministers responsible to the chambers, and every royal act must be countersigned by a minister. The departments of state are 11 in number, under the control of the Minister of the Interior, of the Interior, of Science and Art, of Agriculture and Public Works, of Foreign Affairs, of Industry and Labor, of War, of Justice, of Railways, of the Colonies, and of Marine, and Posts and Telegraphs. The Ministry of Marine was created in November, 1912. The legislative power is vested in the king and the chambers, consisting of the Senate and the Chamber of Deputies. The Senate was composed, in 1911, of 120 members, of whom 93 were chosen by the direct suffrage of citizens over the age of 30, and 27 by the provincial councils. The Chamber of Deputies, which numbered 186 in 1911, is elected by the direct suffrage of every citizen over the age of 25. The chambers meet annually for a session of at least 40 days, but the power of prorogation and dissolution rests with the king. Bills dealing with the revenue and the annual contingent for the army must originate in the lower house. Superimposed on manhood suffrage, which makes every male Belgian not legally disqualified an elector, there is the system of plural suffrage, which gives an additional vote to citizens over 35 years of age possessing legitimate issue and paying at least five francs a year in house tax, as well as to citizens owning real estate to the value of 2000 francs, and two additional votes to professional men and the holders of diplomas from institutions of higher learning. In 1911-12 the number of electors for the Senate was 1,460,236, of whom 755,453 had each one vote, 394,123 two votes, and 310,660 three votes, the number of electors for the Chamber of Deputies was 1,721,755, of whom 998,483 had one vote, 404,786 two votes, and 318,486 three votes. By the law of Dec 29, 1899, the method of proportional representation was initiated. See *History*, below. For arms of the country, see Plate accompanying **HERALDRY**.

Local Government.—Belgium is divided into nine provinces, each under a governor appointed by the crown. The provincial council, which is chosen by direct suffrage for a period of eight years, deliberates on matters of local finance and administration, sanitation, roads, and police, and assesses direct contributions towards the state among the communes. Half the council is renewed every four years. Its acts are subject to the approval of the king. A permanent deputation, consisting of the governor and six men chosen from the council, serves as an executive committee and directs public affairs when the council is not in session. In 1911-12 there were 1,460,236 provincial electors. The provinces are subdivided into 41 arrondissements for administrative purposes and into 26 judicial arrondissements, which are the seats of high courts of original jurisdiction, and these are again portioned out into 222 cantons, each under a justice of the peace. The ultimate unit of local government is the commune. In 1911 there were 2632 communes. The affairs of the commune are debated and decided in the communal council, varying in membership from 7 to 51, and elected directly for a period of eight years by all resident citizens above the age of 25. In 1911-12 there were 1,320,074 communal electors. In communes of more than 2000 inhabitants, supplementary councillors are elected by em-

ployees and working men. The communal council exercises independent jurisdiction over local affairs, but deliberates also on matters delegated to it by the general or provincial government. The executive work of the commune is carried on by an aldermanic college, consisting of a burgomaster appointed by the king, and two or four aldermen elected by the communal college.

Justice in the case of petty civil disputes and minor offenses is administered by the justice of the peace, from whose decision there is no appeal in judgments involving less than 100 francs (\$20), or a penalty of not more than five days' imprisonment. For the trial of important civil cases there are 20 courts of first instance, while misdemeanors are brought before the tribunals of correction, and serious crimes and press offenses before jury courts of assizes sitting four times a year in every province. From the civil courts and the *cours d'assise* appeals lie to the *cours d'appel* at Brussels, Ghent, and Liège. The court of cassation, or supreme court, does not examine the facts of any case, but will reverse a decision of the lower courts where legal formalities have been violated. There are in addition special military and commercial courts and councils of *prud'hommes* for the arbitration of labor disputes, composed of workmen and employees.

Army. The army of Belgium is intended only for the purpose of national defense and the preservation of neutrality, wars of aggression being forbidden by the constitution. The army was recruited mainly by voluntary enlistment, until December, 1909, when a law was passed substituting "personal service" for conscription with substitution, thus considerably reducing the exemptions. In addition to the regular army of 41,000 men in 1910, there is the civil guard, consisting of 48,563 officers and men in 1910. The war strength is about 180,000 men. The terms of military service are eight years in the active forces (of which time two-thirds are spent on furlough) and five years in the reserve. Belgium has no navy. See ARMIES, NAVIES.

History. Belgium takes its names from the ancient Celtic people called the *Belgæ* (qv). The Roman Province of Gallia Belgica embraced a much greater area than modern Belgium, extending from the mouth of the Scheldt nearly to the Seine, and from the Strait of Dover to the range of the Vosges. In the fourth century the Germanic people of the Franks pressed forward into this region, and in the fifth century they became masters of it. After the disruption of the Frankish realm in the ninth century, the bulk of what is now Belgium was included in the Duchy of Lorraine (Lotharingia), which formed part of the realm of the eastern Franks (Kingdom of Germany), while in the extreme west arose the county of Flanders, a fief of the kings of France. In the tenth century the northern half of Lorraine became the Duchy of Lower Lorraine, the name of which was supplanted by that of Brabant in the thirteenth century. Brabant was one of several states that were formed out of the Lotharingian territories, the group including Limburg (annexed to Brabant in 1288), Hainaut, Namur, Mechlin, Luxembourg, and the ecclesiastical principality of Liège. In the latter part of the Middle Ages Flanders (which successfully withstood the encroachments of France) and Brabant attained

an almost unexampled degree of prosperity. Bruges, Ghent, Antwerp, Brussels, and other cities became the seats of a vast industry and commerce, and the arts flourished as nowhere else outside of Italy. In 1384 Flanders was united with Burgundy, whose dukes by the middle of the fifteenth century had come into possession of the greater part of the Belgian and Dutch Netherlands. The rulers of Burgundy aimed at founding a powerful state between France and Germany, and therefore endeavored to repress the free republican spirit which manifested itself in the rapidly rising towns, but the work of establishing an absolute monarchy was interrupted by the fall of Charles the Bold. By the marriage of Mary, daughter of Charles the Bold, with Maximilian in 1477, the Burgundian realm, the most opulent in Europe, passed (with the exception of the Duchy of Burgundy itself) to the house of Hapsburg. On the accession of Charles (the future Emperor Charles V), grandson of Mary and Maximilian, to the throne of Spain in 1516, the Netherlands were united with that kingdom, and in 1549 their formal union with the Spanish crown was decreed. The despotic measures of Philip II, the son and successor of Charles, excited in the Netherlands a long and bloody war for civil and religious freedom, which ended in the independence of the northern or Dutch Netherlands, while in the southern provinces (modern Belgium) both the sovereignty of Spain and the rule of the Roman Catholic church continued. In 1598 the Belgian Netherlands were ceded by Philip II to the Archduke Albert, who married Isabella, daughter of the King, and for a brief time the country became a distinct and independent kingdom. Several measures for the better regulation of internal affairs, especially in the administration of justice, and for the revival of industry, which had been injured by the unenlightened policy of Philip, were projected. Unfortunately Albert died childless in 1621, and Belgium fell back into the hands of Spain and became involved in the wars attending the decline of the Spanish monarchy. Peace generally was concluded at the cost of Belgium. By the Treaty of the Pyrenees (1659), the county of Artois, Thionville, and other districts, were given to France. Subsequent conquests by the same powerful neighbor secured to it, at the Peace of Aix-la-Chapelle (1668), the possession of Lille, Charleroi, Oudenarde, Courtrai, and other places. These were partly restored at the Peace of Nimègue (1678), but as a compensation, Valenciennes, Neupoit, Cambai, Saint-Omer, Chaumont, and other places, were given up, and only partially regained at the Peace of Ryswick in 1697. After the conclusion of this treaty, at the close of the reign of Charles II of Spain, some endeavors were made to create prosperity in Belgium by a new system of taxation and customs and by the construction of canals to counteract the injury done to its commerce by the closing of the navigation of the Scheldt. But these projected improvements were interrupted by the War of the Spanish Succession, concluded by the Peace of Utrecht in 1713. By this treaty Belgium was given to Austria, Holland retaining the privilege of garrisoning the most important fortresses on the French frontier and also of exercising a monopoly of the navigation of the Scheldt. The Belgian Commercial Company at Ostend, founded

by Charles VI in 1722, fell in 1731—another sacrifice to the cupiditv of Holland. During the War of the Austrian Succession (1744) almost the whole country fell into the hands of the French, but was peaceably restored to Austria by the Treaty of Aix-la-Chapelle (1748).

Belgium remained undisturbed by the Seven Years' War, and during the long peace following the Treaty of Aix-la-Chapelle prosperity was restored, and especially was this the case during the mild reign of Maria Theresa of Austria. Joseph II, son and successor of Maria Theresa, sought to obliterate the line which William of Orange and Marlborough had drawn with so much pains between the Dutch Netherlands and the Austrian Provinces. He compelled Holland to consent to the abolition of the barrier contract, and in consequence the Dutch garrisons were removed. The Dutch strenuously resisted his attempt to restore the free navigation of the Scheldt, and as France supported them in their resistance the Emperor had to yield. Meanwhile his administrative reforms offended the people of his own provinces. In a short time discontent openly manifested itself. The Austrian authorities were attacked, Brabant refused to pay taxes, while the more violent fled into Holland and organized an armed expedition. In 1787 a Belgian republic was proclaimed, but Leopold II, who succeeded Joseph II in 1790, suppressed this insurrection, agreeing, however, to a restoration of the old constitution and privileges. The peace that followed was interrupted by the outbreak of the French Revolution. The Belgian Netherlands were conquered by Pichegru in the campaign of 1794 and ceded to France by the Treaty of Campo Formio. The country shared the fortunes of France during the Consulate and the Empire, received the *Código Napoléon* and in all political relations was a part of France. After the fall of Napoleon it was united with Holland, and its boundaries defined by the Congress of Vienna (1815).

The union brought into sharp relief the difference between the Dutch Protestant population, with their commercial habits, and the Catholic population of agricultural and manufacturing Belgium. Furthermore, the important provisions of the constitution had regard chiefly to the interests of Holland. Attempts were made to make Dutch the official language, the privileges of the Belgian clergy were abridged, and the poorer classes were severely taxed, while the government was almost exclusively composed of Dutchmen. The Liberals and the Catholics both strongly resented the encroachments of Holland—the Liberals, from a desire to preserve the national secular institutions, the Catholics, from a desire to preserve the national church. When these parties showed signs of coalescing, the government attempted concessions, which came too late to check the outburst of dissatisfaction, then followed reactionary attempts at coercion and intimidation, which fanned the flame of discontent.

Inspired by the French Revolution of 1830, the Belgians revolted against the Dutch. The rising took place in Brussels, Aug 26, 1830, and soon spread over all Belgium. Finding that the revolt was spreading in spite of force, King William offered a separate government for the Belgians and a personal union with Holland. The Belgians rejected this, declared their inde-

pendence, October 4, organized a provisional government, and called a congress, which met in November and adopted three principles: (1) Belgian independence, (2) hereditary monarchy, with representative institutions, (3) exclusion of the House of Orange. They then proceeded to frame a constitution. The citadel of Antwerp was still held by a Dutch garrison under the intrepid General Chassé. Meanwhile the London Conference of the Powers had assembled to consider this breach of the treaties of 1815, and after mature deliberation recognized the independence of Belgium as a *fait accompli* (December 10). During 1831 the Conference arranged the terms of the separation, and in 1832 Belgium was neutralized and its neutrality was guaranteed by the Concert. Meanwhile the Belgian Congress had elected as King a son of Louis Philippe, but he declined under pressure from England, and after the brief regency of Baron Surlet de Chokier, Prince Leopold (qv) of Saxe-Coburg was elected King, June 4, 1831, and subscribed to the constitution. This prince proved himself a wise monarch. Holland refused to acknowledge the validity of the decision of the London Conference and sent an army against the Belgians, who were defeated in August, 1831. A French army under Marshal Gérard advanced to arrest the progress of the Dutch. England gave a note of warning, and the Dutch forces were withdrawn. Holland, however, still refused to abide by the decrees of the London Conference, and England and France proceeded to renewed coercion. The coast of the Netherlands was blockaded, and Marshal Gérard laid siege to the citadel of Antwerp. On Dec 23, 1832, General Chassé surrendered, and the liberation of Belgium was completed. Holland made peace with England and France at London, on May 21, 1833. A definite settlement between Holland and Belgium was not effected until 1839, when it was agreed that Luxembourg and Limburg should be divided between the two kingdoms.

The government of Belgium was of the parliamentary type, the people, as represented by the electorate, being regarded as the source of power. As soon as independence was achieved and recognized by Europe, the Liberal and Clerical parties, which had united against outside influence, fell into their natural opposition. The Liberals declared the encroachments of the Catholic religion to be "dangerous and continually hostile to civil society." The King studiously avoided organizing a party ministry, and the minister of justice declared that "the division into Catholics and Liberals is without meaning in the presence of the great principles of liberty consecrated by the constitution." The Education Act of 1842 made moral and religious instruction compulsory in the public schools, and entrusted it to the Church, under government supervision. This brought the school question permanently into Belgian politics, where, with the suffrage, it has since held the leading place. The elections of 1847 at last brought to a close the system of government in subservience to the church. A new Liberal ministry was formed by Rogier and others, whose programme promised the maintenance of the independent civil authority. The institution of numerous agricultural and commercial schools, normal *ateliers*, popular libraries, and other means used for raising the working class, were followed by most beneficial results. The

revolutionary movement which swept over Europe in 1848 menaced the tranquillity of the country, but the King declared himself ready to retain or to surrender the crown of Belgium according to the decision of the people. This declaration strengthened the party of order, while it disarmed even those most disaffected to the crown. Leopold I died in 1865, and was succeeded by his son, Leopold II. Leopold II (qv), a shrewd business man, is chiefly remembered in history for the support given by him to the International African Association, resulting in the establishment of the Congo Free State (qv), of which he was chosen sovereign. By a will executed in 1899, King Leopold bequeathed his new dominions to the Belgian State. In 1890 a convention was entered into by Belgium and the Congo Free State, by which Belgium, in consideration of a subsidy of 25,000,000 francs to the Congo Free State, received the right to annex that country at the end of 10 years. This right is still continued under an Act of Aug. 10, 1901. The outbreak of the Franco-Prussian War in 1870 threatened the neutrality of Belgian soil, causing something of a panic, which was intensified on the publication, by the Prussian Foreign Office, of a secret proposal made some time previously by Napoleon III to Prussia, involving the annexation of Belgium to France. But the written assurance of both the French Emperor and the Prussian King, to the effect that Belgian neutrality would be scrupulously respected, served to restore tranquillity, and these personal assurances were formally embodied in a treaty between England, France, and Prussia in the same year.

During the first decade of the twentieth century the Congo question was paramount in Belgium. Investigation proved time many accusations of cruelty practiced there by government officials. Leopold had treated the Congo region more as a personal source of private revenue than a ward of Belgium, and as a result his personal overlordship of the territory was abolished and in 1908 the Congo Free State was annexed to Belgium. The following year Leopold died, and was succeeded by his son who was crowned Albert I. Within Belgium, political strife has centered mainly about the suffrage, in 1890 the agitation for universal suffrage culminated in a monster popular demonstration, which led the ministry to promise in November of the same year an immediate consideration of the question. The constitution as revised in 1893 embodies the results of this struggle. The suffrage was conferred on all male Belgian citizens above the age of 25, but to counterbalance this sudden increase in the power of the lower classes, one or two supplementary votes were allowed in certain cases. Under this provision, 1,462,232 voters disposed of 2,239,621 votes in the year 1900. Its adoption gave the Catholic party a very large majority. The old Liberal party practically disappeared, the opposition being represented by a radical Socialist party. To regain something of its former power, the Liberal party, aided by the Socialists, instituted an agitation for the establishment of the principle of proportional representation, in accordance with which representation in the chambers is apportioned among the different political parties in proportion to the number of votes cast by each at the election for deputies. Such a measure was adopted in

1899, and the immediate result was the rise of the Liberal party. The coalition of Liberals and Socialists for a number of years continues to agitate for the extension of proportional representation, and ultimately, of universal suffrage to provincial and communal elections. But in this they have been unsuccessful. The continued prosperity of Belgium has told largely against them, and the last election (1912) was virtually a Catholic triumph, the Catholic party having a clear majority over all others of 16. The Socialists in despair organized a general strike which began April 14, 1913, and continued to April 23, of the same year. The strike was by no means universal, and the utmost that was obtained by it was the promise of an electoral commission to report on the condition of suffrage. Despite, however, the inequalities in the suffrage laws, there has been much advance in recent years in Belgium in social legislation. The hours of work in unhealthy trades have been regulated, old-age pensions have been provided for miners, night labor in factories has been forbidden to women, children's judges have been provided, and also arbitration boards for industrial pursuits to which women are eligible. For the Congo question see BELGIAN CONGO.

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BELGOROD, byél'gò-rót, or **BIELGOROD** (Russ. *byelyi*, white + *gorod*, city). The capital of a district and an archiepiscopal see in the Russian government of Kursk, situated on the right bank of the Donetz, 87 miles south of Kursk and 43 miles from Kharkov (Map Russia, E 4). Belgorod, which derives its name from a neighboring chalk hill, is divided into two—the old and the new—towns. It has manufactures of leather and soap, and agriculture is fairly well developed. There is a considerable trade in wax, apples, tallow candles, and especially of chalk, of which about 1800 tons are

produced annually within the city limits Pop, 1897, 21,900

BELGRADE, bēl'grād' (Serv *Beograd*, from *bēl*, white + *grad*, city, fortress, in Ger *Weisenburg*, same meaning, anciently *Singidunum*) The capital of Serbia, situated at the confluence of the rivers Save and Danube opposite the Slavonian town of Semlin (Map Turkey in Europe, C 2) It contains half a dozen distinct quarters The famous old fortress occupies in part the level ground at the junction of the two rivers and in part is built on a hill about 150 feet high Belgrade, with its wide streets and its electric lighting and transit systems, presents an entirely modern appearance. One section, known as the English quarter, has handsome villas and gardens There are large business houses and hotels and a number of banks The King's palace, the metropolitan cathedral and residence, the national theatre, and the public offices are among the principal buildings One of the old mosques is in a good state of preservation The city contains fine parks, an old Turkish kiosk erected for Prince Milosh, and a monument to Prince Michael At the head of the educational institutions is a university with faculties of philosophy, jurisprudence, and engineering Belgrade is the seat of the Royal Serbian Academy of Sciences, to which belongs the national library, with about 60,000 volumes It is the great entrepôt of the trade between Austria-Hungary and Serbia The exports are largely raw Serbian products, the imports, manufactured articles The population has increased rapidly, in 1884 there were 26,600 inhabitants, in 1890, 54,500, in 1895, 59,100, in 1900, 69,097, in 1905, 77,816, in 1910, 90,890 At the close of the Middle Ages Belgrade was a frontier fortress of Hungary and in the Turkish wars was a key to that kingdom It was stormed in 1521 by the Turks, who had attempted to capture the town in 1456 and had been repulsed with great loss by John Hunyady and a crusading force Thrice taken for Austria—in 1683 by the Elector of Bavaria, in 1717 by Prince Eugène (after a brilliant victory over the Turks), and in 1789 by General von Laudon—it was restored each time, by treaty, to the Turks Though Serbia became practically independent in the early part of the nineteenth century, the Turkish garrison was not withdrawn till 1867

BELGRAND, bēl'gran', MARIE FRANÇOIS EUGÈNE (1810-78) A French civil engineer, born at Ervy (Aube) He studied at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, became in 1852 a chief engineer, and in 1875 an inspector general of the first class He designed the water supply and sewerage systems of Paris, two mammoth works of engineering His publications include *Les travaux souterrains de Paris*, consisting of four parts, *La Seine, études hydrologiques, régime de la pluie, des sources des eaux courantes* (1873), *Les eaux et les aqueducs romains* (1875), *Les eaux anciennes de Paris* (1877), and *Les eaux nouvelles* (1882)

BELGRA'VIA The fashionable residence district in London, built up south and west of Belgrave Square In the early part of the nineteenth century it was a marshy farm, which was filled in and drained about 1825 Consult Hare, *Walks in London* (London, 1883)

BELHAVEN A town in Beaufort Co, N C, 120 miles (direct) each by south of Raleigh,

situated at the mouth of the Pungo River, near Pamlico Sound, and on the Norfolk Southern Railroad (Map North Carolina, F 2) The surrounding region is fertile, the principal products being cotton, corn, and potatoes Fish and oysters are taken from the near-by waters The town contains a large cooperage and lumber mills Pop, 1910, 2800, 1913 (est.), 3200

BELIAL, bē'l'al or bē'l'yal A Hebrew term occurring 27 times in the Old Testament, and generally taken to mean 'wicked' or 'worthless,' both in the moral and the material sense It occurs very frequently in the Bible in the phrase "sons of Belial" (1 Kings xxii 10, 13, 2 Chron xiii 7, Deut. xiii 13), and however we may account for it, Belial was personified and became a designation of the arch-demon Satan (2 Cor vi 15). The etymology which until recently was current, dividing the word into two parts, *bēl*, 'without,' and *yaal*, 'worth,' is to be rejected It has been satisfactorily shown by Cheyne (*Expositor*, 1895, pp 435-439) that the word *bēl* is used in the Old Testament in three senses (1) great wickedness, (2) hopeless ruin, and (3) subterranean watery abyss (Ps xviii 4) In view of this third meaning Cheyne proposes to connect Belial with Belihl, a goddess of the underworld in Babylonian mythology There is much to be said in favor of this view, though of course we must assume that the term, after coming to the Hebrews, was developed (as were the other mythological terms of foreign origin) in a manner that in the course of time separated it from its Babylonian prototype

BELLANÍS (bā'lé-a-nés') OF GREECE A continuation of *Amadis of Gaul*, by Jerónimo Fernández (1547) It was translated from the Spanish into Italian in 1586, into English in 1598, and into French in 1825 It was one of the books in Don Quixote's library, and was censured there by the "cure" for its masses of extrinsic detail Another English version appeared in 1673

BELIDOR, bā'lé'dor', BERNARD FOREST DE (c 1698-1761) A French military engineer, born in Catalonia He was the inventor of military mining and continues an authority on subjects connected with hydraulic architecture and artillery He published *Sommaire d'un cours d'architecture militaire, civile, et hydraulique* (1720), *Tratté des fortifications* (1735)

BELIEF (the verb *believe*, AS *gelyfan*, Goth *galaubjan*, Ger *glauben*, literally means 'to esteem dear, to value', cf E *hef*, Goth *haba*, dear, Lat *habet*, *habet*, it pleases, Ger *Liebe*, love) In discussing the subject of belief, the psychologist has to distinguish sharply between two related questions that of the composition of the believing or assenting consciousness, and that of the nature of belief as an attitude or function of mind at large Under the former head (1) we find the most diverse views prevailing in the different psychological systems Locke (1632-1704), James Mill (1773-1836), and Spencer (1820-1903) offer a purely intellectualistic analysis For Locke belief is an association of ideas on the ground of probability If the association corresponds to a natural connection among the objects of idea, the belief is right, otherwise it is wrong The reasons for erroneous assent are to be found in want of proofs, want of ability or will to use them, and wrong measures of probability (reliance on authority, yielding to passion) Mill declares, in similar vein, that in

every instance of belief there is an indissoluble association of ideas. "I never have a sensation, nor the idea of that sensation, without associating with it the idea of myself. In the case of a present sensation, and that of a present idea, the sensation and the belief in the sensation, the idea and the belief in the idea, are not two things, they are, in each case, one and the same thing." Those psychologists who deem these analyses defective have pointed out that while belief always implies the presence in consciousness of ideational material, the object of belief, it is rather a feature of the emotional and volitional than of the purely intellectual life. This fact is recognized by Bagehot, when he speaks of the "emotion of conviction", by James, when he defines belief as "a sort of feeling more allied to the emotions than to anything else", and by Bain, who, postulating a primitive tendency to credulity as he postulates a primitive tendency to spontaneous movement, describes belief as "in its essential character a phase of our active nature, otherwise called the will."

Recent experiments show, in fact, that belief may have either an affective or an ideational course. Moreover, belief may appear as an overt train of mental processes, or it may be implicit in the course and arrangement of a given consciousness. These results need confirmation, but they serve, so far as they go, to account for the great variety of analysis offered in the pre-experimental period.

(2) *The nature of belief as an attitude or function of the mind at large*.—That belief can be envisaged, not as a complex of conscious processes, but as a state of consciousness (see ATTENTION), appears in Hume's (1711-76) account of it. "Belief is nothing but a more vivid, lively, forcible, firm, steady conception of an object than the imagination alone is ever able to attain. It consists in the manner of the conception [of the ideas] and in their feeling to the mind. It gives them more weight and influence, makes them appear of greater importance, enforces them in the mind." Hume does not profess "perfectly to explain" this mode of conception. He is followed by J. S. Mill, who asserts that the difference between "thinking of a reality and representing to ourselves an imaginary picture" is "ultimate and primordial", and by Brentano, who makes "judgment" one of the elementary conscious functions. Without questioning the functional uniqueness of the state of assent, we may say, in general, that belief is a state of attention, with extreme liability of suggestion in a given direction.

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BELINDA. See EDEWORTH, MARIA.

BELINSKY, byé-lén'ské, VISARION GRIGOREVICH (1810-48). A Russian literary critic, a contemporary of Gogol, Turgenev, and Dostoyevsky. He was born in southern Russia, the son of a district physician in the government of Penza. He attended the gymnasium at Penza and studied philology at the University of Moscow, where he became intimate with the "idealist" circle of Stankevitch, Herzen, and others. In 1832, on account of a tragedy (in

the style of Schiller's *Robbers*) directed against serfdom, he was expelled from the university, ostensibly on the ground of "incapacity." In 1834 he made his debut with the famous "Literary Reveries"—a brilliant survey of the historical development of Russian literature—in *Rumoi*, and contributed to it and the *Moscow Telescope* until their suppression in 1836. Two years later, with several friends, he undertook to edit the *Moscow Observer*. Under the influence of Bakunin and a one-sided interpretation of Hegel's proposition, "Whatever is, is right," he preached complete acceptance of and conciliation with reality. At the same time he expounded the theory of art for art's sake, which aimed at an artistic embodiment of "eternal ideas" and not at a reproduction of life. In 1839 he went to the capital and became principal contributor of the *Memoirs of the Fatherland*. "Reality" soon frightened him here, and all the fiery striving for truth and right now turned into deep grief over this reality. From 1840 to 1848 he wrote a series of long essays on Derzhavin, Lermontov, Gogol, Koltsov, Pushkin (the last a volume of over 600 pages), and other popular writers, the whole forming practically a history of Russian literature from Lomonosov down to his own day. Belinsky's critiques now acquired a social character, and he appeared not only as a keen aesthetic judge, but as a passionate literary propagandist as well, fighting for personal rights, unmasking social and literary hypocrisy, scourging conservatism, conventionalism, and lack of humaneness in society. In 1846 he began to contribute to the *Contemporary*, rejuvenated under the editorship of the poet Nekrasov. His last great effort was his *Literary Review for the Year 1847*, in which he saw the hope of Russian literature in the "naturalistic" works of Turgenev, Gontcharov, Dostoyevsky, and others. His health was undermined by the hardships he had endured and his incessant literary labors, and the trip abroad could not check the progress of consumption, which brought him to his early grave on the eve of his arrest by the police on account of his radical views.

A perfect master of style, passionate and endowed with a brilliant fancy, with a natural bitterness greatly increased by physical ailing and the hardships of life, he poured all his heart and soul into his work. Greeting with ardent delight the appearance of promising new writers, he unceasingly foretold their future development, basing his opinions upon a careful analysis of their work. Besides giving correct estimates of all the chief Russian writers and bringing down the history of Russian literature to certain well-defined periods, he was the first Russian to establish right conceptions of art and literature and to point out the direction which literature must take to become a social force. In 1910 Russia celebrated the centenary of Belinsky's birth with an enthusiasm and appreciation worthy of one of her greatest literary critics, the founder of higher journalism, and a humanitarian unsurpassed in Russian history.

His works, in 12 volumes, were first published in 1850-62. In 1898, after the expiration of copyright, several new editions appeared. The best is that supplied with profuse notes by S. Vengerov. Consult A. Pypin, *Belinsky's His Life and Correspondence* (Saint Petersburg, 1876).

BELISARIUS (Slav *byelû*, white + *tsar*, prince, czar) (c 505-565). An heroic and loyal

Byzantine general, to whom the Emperor Justinian was indebted for many of his victories. He was born in Thrace, and first attained celebrity as the commander of the Eastern army or the Empire, stationed on the confines of Persia, where in 530 A.D. he gained a victory over a Persian army nearly twice as large as his own. The historian Procopius was at this time secretary of Belisarius. In the following year Belisarius was compelled by the impatience of his troops to offer battle at Callinicum, a town at the junction of the rivers Bilecha and Euphrates, some authorities state that he was defeated, and in consequence recalled, this is probably not true. At all events, he remained faithful to his sovereign, and rendered him great service in Constantinople, where the strife of "the Greens" and "the Blues" (two of the factions into which the keen interest in the chariot races in the circus long had split the people) had endangered the authority and even the life of Justinian. Already a new Emperor, Hypatius, had been elected, when Belisarius, at the head of the Life Guards, attacked and slew in the race course 30,000 of the rioters and restored tranquillity (532). Previous to this he had married a wealthy but profligate lady, Antonina, who accompanied him on his military expeditions. In 533 A.D. Belisarius was sent, with an army of 15,000 men, to recover the province of Africa held by the vandal King, Gelimer. Belisarius gained two victories, made the King a prisoner, seized his treasures, and brought him to Constantinople, conquering on the way Sardinia and the Balearic Isles. Medals were struck in Belisarius' honor, and in March, 534, he was invested with the dignity of Consul, having previously enjoyed the distinction of a double triumph, according to the old Republican custom.

Belisarius was not idle long. The divisions existing in the royal family of the Ostrogoths induced Justinian to attempt to wrest Italy from their hands. In 535 Belisarius conquered Sicily, and in the autumn of 536 he crossed over to lower Italy, where all the cities submitted to him except Naples, which he carried by storm. On December 10 he entered Rome, and held it for a year against the Goths, until the enemy raised the siege. In 538 Narses was dispatched with reinforcements for the army in Italy, but some misunderstanding occurred between the two generals, and they failed to relieve Milan, which in 539 was sacked by Biazas, nephew of the Gothic King, Vitiges. Narses was recalled from Italy, and Belisarius was placed at the head of both armies. Refusing his assent to a treaty proposed to King Vitiges by Justinian's ambassadors, he drove the Goths back to Ravenna, which he captured, together with Vitiges himself. But before he could complete his conquest of the Goths, he was recalled by Justinian to Constantinople. In 541-542 he was engaged in a campaign against the Persians, who had captured Antioch, but he was again superseded, if Procopius is worthy of belief, on account of the slanderous representations made to the Emperor by his own wife, Antonina. His second great struggle with the Ostrogoths now began. The barbarians, under Totila, had again invaded and conquered Italy. In 544 Belisarius was sent against them, but with an insufficient army. He, however, maintained his ground for about four years, harassing the enemy by his skillful movements, and succeeded in regaining possession of Rome for a time, but in spite of

his repeated entreaties no reinforcements were sent to him and in September, 548, he was recalled. His rival, Narses, was appointed in his place.

After 10 years of retirement Belisarius once more came forward, at the head of an army hastily collected, and overthrew the Bulgarians, who threatened Constantinople. Towards the end of his life this faithful servant, who at Ravenna had refused the crown of Italy offered to him by the Goths, was accused of a conspiracy against Justinian, and imprisoned, December, 563, but, according to Malala and Theophanes, Justinian became convinced of his innocence, and restored him, after seven months, to all his honors. He died March, 565.

The life of Belisarius has been treated with great license by writers of fiction, especially by Marmontel, who represented the hero as cruelly deprived of sight and reduced to begging for his bread in the streets of Constantinople. Tzetzes, a writer of the twelfth century, states that during his half-year's imprisonment Belisarius suspended a bag from the window of his cell and exclaimed to those who passed by "Give an obolus to Belisarius, who rose by merit and was cast down by envy", but no writer contemporary with Belisarius mentions this circumstance. Lord Mahon, in his life of Belisarius (London, 1829), endeavors, but without success, to confirm the tradition, or rather the fiction, of Belisarius' having been deprived of sight and reduced to mendicancy. This fiction supplies the subject of a fine picture by the French painter Gérard. The works of Procopius are the most important original sources for the life of Belisarius. For secondary works, consult Bury, *Later Roman Empire* (London, 1893), Hodgkin, *Italy and Her Invaders* (Oxford, 1880-85), Gibbon, *Decline and Fall*, edited by Bury, vol. iv (London, 1898), *The Cambridge Medieval History*, vol. 1 (New York, 1911).

BELIZE, be-liz', or **BALIZE**. The capital and chief seaport of the colony of British Honduras (q.v.), in Central America (Map Central America, C 2). It is situated at the mouth of the Belize River. Coral reefs along the coast form a natural breakwater through which a passage admits vessels into the harbor. Ocean-going vessels are obliged to load and unload by means of lighters. The town has considerable trade in logwood and mahogany. It has been the centre of this trade for over 300 years. Pop., 1903, 9113, 1911, 10,478.

BELKINE, byl'ken, IVAN. The pseudonym of the Russian poet Pushkin.

BELKNAP, bel'näp, GEORGE EUGENE (1832-1903). An American naval officer, retired in 1894. He was born in New Hampshire. In 1847 he entered the navy as a midshipman. From 1856 to 1858 he served in the East Indies. In the Civil War he commanded the *New Ironsides* during the bombardment of the forts and batteries in Charleston harbor and led the attack at the capture of Fort Fisher, N. C. In 1874, as commander of the *Tuscarora*, he was engaged in making deep-sea soundings between the United States and Japan, to determine the possibility of laying a submarine cable across the Pacific, and invented an apparatus for securing specimens of soil from the ocean bed which is now used in both the naval service and the coast survey. He was appointed superintendent of the United States Naval Observatory in 1885 and became a rear admiral in 1889.

BELKNAP, JEREMY (1744-98) An American Congregational minister, born in Boston, and pastor at Dover, N H, and at Boston. He was a graduate of Harvard (1762) and in 1791 founded the Massachusetts Historical Society. Among his works are a painstaking and readable *History of New Hampshire* (3 vols, 1784-1792), *American Biography* (2 vols, 1792-98), *The Foresters: An American Tale* (1796), and a *Collection of Psalms and Hymns* (1795). He devoted much of his life to historical and biographical research. His *Life*, with parts of his correspondence, appeared in New York, 1847.

BELKNAP, WILLIAM WORTH (1820-90) An American soldier. He was born at Newburgh, N Y, graduated at Princeton in 1848, and settled as a lawyer in Keokuk, Iowa. He entered the Union army as major of volunteers, 1861, distinguished himself in Sherman's Atlanta campaign, and was brevetted major general in 1865. He was Secretary of War under President Grant from 1869 to 1876 and in the latter year was impeached on charges of corruption, but resigned before the proceedings could be formally begun, so that this charge was dropped on the ground of lack of jurisdiction. He committed suicide.

BELL (perhaps connected in origin with *bell*, *bellows*, to roar). A hollow, cup-shaped, metallic percussion instrument, suspended by a neck and sounded by a swinging clapper, or a hollow metallic sphere sounded by a loose ball in its interior. From a remote antiquity cymbals and hand bells were used in religious ceremonies. In Egypt it is certain that the feast of Osiris was announced by ringing bells, the Jewish high priests wore golden bells attached to their vestments, and in Athens the priests of Cybele used bells in their rites. The Greeks employed them (*koda*) in camps and garrison, and the Romans announced the hour of bathing and of business by the *tintinnabulum*. The introduction of bells into Christian churches is usually ascribed to Paulinus, Bishop of Nola, in Campania (353-431), but there is no evidence of their existence for a century later. That they were first made in Campania is inferred from the name given to them—*campanæ*, hence, *campanile*, the bell tower. Their use in churches and monasteries soon spread through Christendom. They were introduced into Gaul about 500, and Benedict, Abbot of Wearmouth, brought one from Italy for his church about 680. Pope Sahinian (600) ordained that every hour should be announced by sound of bell, that the people might be warned of the approach of the canonical hours (qv). Bells came into use in the East in the fifth century, and in Switzerland and Germany in the eleventh century. Most of the bells first used in western Christendom seem to have been hand bells. Several examples, some of them, it is believed, as old as the sixth century, are still preserved in Ireland, Scotland, and Wales. They are made of thin plates of hammered iron, bent into a four-sided form, fastened with rivets, and brazed or bronzed. Perhaps the most remarkable is that which is still preserved at Belfast, and said to have belonged to St Patrick, called the *Clog-an-eadhachta Phádraic*, or 'the bell of Patrick's Will'. It is 6 inches high, 5 inches broad, and 4 inches deep, and is kept in a case or shrine of brass, enriched with gems and with gold and silver filigree, and made (as an inscription in Irish shows) between the years 1091 and 1105. The bell itself is believed to be mentioned

in Ulster annals as early as the year 552. The four-sided bell of St Gall, an Irish missionary, who died about 646, is still shown in the monastery of the city which bears his name in Switzerland. Church bells were suspended either in the steeples or church towers, or in special bell towers. They were long of comparatively small size, the bell which a king presented to the church of Orleans in the eleventh century, and which was remarkable in its age, weighed only 2600 pounds. In the thirteenth century much larger bells began to be cast, but it was not until the fifteenth century that they reached really considerable dimensions. The bell "Jacqueline," of Paris, cast in 1400, weighed 15,000 pounds, the famous bell of Rouen, cast in 1501, weighed 36,364 pounds. The largest bell in the world is the great bell of Moscow, cast in 1733, it being 21 feet high, 21 feet in diameter, and weighing 432,000 pounds. This bell, in 1737, was injured by a fire and remained partly buried in the earth until 1837, when it was raised, and now forms the dome of a chapel formed by excavating the earth beneath it. Among other large bells are the great bell of Burma, 12 feet high, 16½ feet in diameter, weighing 260,000 pounds, the great bell at Peking, 14 feet high, 13 feet in diameter, and weighing 130,000 pounds, those at houses of Parliament, London, 30,000 pounds, Montreal Cathedral, 28,500 pounds, Notre Dame, Paris, 28,672 pounds, St Peter's, Rome, 18,600 pounds, St Paul's, London, 11,470 pounds.

An interesting installation of bells are the four forming the Westminster peal of the tower of the Metropolitan Life Insurance building in New York City, which ring at twice the height of any other peal in the world. The four bells weigh seven tons and are not suspended but are mounted on upright supports and used with automatic clappers to strike the quarter hours. The largest bell weighs 7000 pounds and is 70 inches across the mouth, being tuned to B flat. It strikes the hours as well as takes part in the general choir. The second bell weighs 3000 pounds and is tuned to E flat, while the third, weighing 2000 pounds, is tuned to F natural, and the fourth, of 1500 pounds, is tuned to G.

The art of casting bells seems to have made little advance as the result of modern inventions, it being impossible to make better bells to-day than were made 300 or 400 years ago. The material used in making bells is a kind of bronze known as bell metal (see ALLOYS), which is an alloy of copper and tin. Authorities differ as to the best proportions of the copper and tin. Some give 80 parts of copper to 20 of tin, or 4 to 1, others increase the tin to 16 to 5, and again others state the proportions as being 3 to 1. In the reign of Henry III of England it would seem to have been 2 to 1, and the small bronze bells discovered by Layard in the palace of Nimrud are found to contain 10 of copper to 1 of tin. Hand bells are often made of brass, antimony alloyed with tin, German silver, real silver, and gold. The notion that in old times silver was mixed with bell metal to sweeten the tone is a mistake. Silver, in any quantity, would injure the tone. The quality of a bell depends not only on the composition of the metal it is made of, but very much also on its shape, and on the proportions between its height, width, and thickness, for which the bell founder has rules derived from experience and confirmed by science. The pitch of a bell is higher the smaller it is. For a peal of four bells to give the pure

chord of ground tone (keynote), third, fifth, and octave, the diameters require to be as 30, 24, 20, 15, and the weights as 80, 41, 24, 10. A smaller quantity of metal than is due to the calibre of the bell, though giving the same note, produces a meagre, harsh sound, and the real or fancied superiority in dignity of tone of some old bells is ascribed to a greater weight of metal having been allowed for the same note than modern economy would dictate. Bells have been cast of steel, some of which have had a tone nearly equal in fineness to that of the best bell metal, but deficient in duration, having less vibration. Some have also been cast of glass, with a considerable thickness of the material, and these give an extremely fine sound, but are too brittle to stand the continued use of the clapper.

The manufacture of bells is simply a process of founding. A core is first constructed of brickwork, which is covered with layers of clay which, by means of a template, is formed to the exact form and dimensions of the interior of the bell to be cast. On this mold is laid a "model" of earth and hair, which is the exact counterpart of the future bell. A third and heavy shell is then built over the model, which, when completed, is lifted, and the "model" is broken away from the core, and the outside shell is then replaced, leaving a space between it and the core the exact size and shape of the "model." Into this space the molten bell metal is run and allowed to cool.

After the casting is trimmed the bell is tuned by paring off metal from its interior. This process of tuning has been reduced to a highly scientific basis, and it is now realized that a bell to be properly in tune with others must be in tune with itself. It must have at least five tones at correct intervals to one another so that they form a perfect musical chord. These tones or harmonics are called the hum note, fundamental, and nominal, and the third and fifth to the fundamental or strike note. In the case of a C bell the first three would give three C's in octaves.

In recent years, particularly in the United States, so-called tubular bells, consisting of cylindrical tubes of bell metal suspended vertically from hooks, have been employed for sets of chimes both in and out of doors. These tubes, which are suspended by loops of leather, catgut, silk, or other cords passed through holes drilled in the walls of the tube, are struck from above by hammers, usually through the agency of an appropriate mechanism connected with a clock or other movement, and the different tones of a combination are obtained by adjusting the length and weight of the tubes, the shorter the tube the higher the pitch. The largest tubes for out-of-door use probably run to 8 or 9 feet in length with a weight of 200 pounds or thereabouts, but difficulties have been encountered in tubes of large size due to atmospheric changes and other causes affecting the tuning. The advantages are the light weight and the facility with which the striking mechanism can be arranged for controlling the various changes and tunes. Tubular chimes are found at their best in hall clocks where the tubes are usually nickel-plated and are particularly suitable for electric control mechanism.

From old usage bells are intimately connected with the services of the Christian Church and thus have acquired a kind of sacred character.

They were founded with religious ceremonies and consecrated by a complete baptismal service, received names, had sponsors, were sprinkled with water, anointed, and finally, covered with the white garment of chrism, like infants. This usage is as old as the time of Alouin (735-804) and is still practiced in Roman Catholic countries. Bells had mostly pious inscriptions, often indicative of the widespread belief in the mysterious virtue of their sound. They were believed to disperse storms and pestilence, drive away enemies, extinguish fire, etc.

Church bells were at one time tolled for those passing out of the world. The custom of ringing what was called the *passing bell* "grew" (*Quarterly Review*, September, 1854) out of the belief that devils troubled the expiring patient and lay in wait to afflict the soul the moment when it escaped from the body. . . . The tolling of the passing bell was retained at the Reformation, and the people were instructed that its use was to admonish the living and excite them to pray for the dying. The practice of slowly and solemnly tolling church bells at deaths, or while funerals are being conducted, is still maintained as a mark of respect for the deceased. The *pardon bell* of pre-Reformation England was tolled before and after divine service, to call the worshippers to a preparatory prayer to the Virgin Mary before engaging in the solemnity, and an invocation for pardon at its close.

The ringing of the *curfew bell*, supposed to have been introduced into England by William the Conqueror, was a custom of a civil or political nature and only strictly observed till the end of the reign of William Rufus. Its object was to warn the public to extinguish their fires and lights at eight o'clock in the evening. The eight-o'clock ringing is still continued in parts of England and Scotland. An article in the *Ecclesiastical Review*, 1911, gives a survey of the historic uses of bells in church worship.

The *hanging of bells* in dwelling houses, and ringing them by means of wires, either mechanically or electrically, from the different apartments, is a comparatively modern invention, for it was not known in England in the reign of Queen Anne. The form of bell now most commonly used for houses and for call bells in hotels, business houses, etc., is the electric bell. The arrangement required to ring a bell or system of bells by electricity is simple. Some form of galvanic battery requiring little attention is placed in any convenient corner, and from it an insulated wire, with the necessary branches, is conducted to the various rooms, thence to, perhaps, as many bells, and finally back to the battery to complete the circuit. Each single bell is provided with a clapper, to which is fixed a piece of soft iron. Near this is an electro-magnet, wound with a quantity of insulated wire, to which the main wire is connected, so that upon the passage of the signal current the magnet attracts the piece of iron fastened to the clapper, and the clapper strikes the bell. In this way any number of bells may be rung at once by sending a powerful current through the wire to which they are all connected. Such arrangements of bells are used very extensively for giving signals simultaneously in a number of rooms or buildings—for example, for striking the hours in all of the rooms of a school building, for sounding alarms of fire throughout hotels or large buildings, etc.

Bells for continuous vibratory ringing are of

the same construction as those just described, excepting that they are provided with a device for continuously vibrating the clapper while the bell is being rung. The wire, instead of being connected directly to the coil around the magnet, is connected to a post, against which the clapper rests after striking the bell. The coil is connected to the clapper, and the current passes through the post, and the clapper to the coil. When a signal on the wire causes the magnet to attract the clapper and strike the bell, the connection is immediately severed by the clapper leaving the post, and no more current can pass until the clapper has returned after striking the bell. Instantly when this occurs the connection is reestablished, the clapper retracted, and the bell again struck. Thus a continuous ringing is produced as long as the person presses the calling button. This push button is simply an ornamental cap covering the terminals of the wires leading to the bells. A slight pressure of the hand upon the button in the centre forces the spring-shaped terminals of the wires into contact with each other and allows the current to pass from the battery to the bell.

Consult Briscoe, *Curiosities of the Belfry* (London, 1883), Tyack, *A Book about Bells* (London, 1899), Walters, *Church Bells of England* [with bibliography] (London, 1912), Beckett, *Clocks, Watches, and Bells for Public Purposes* (London, 1903), Pease, *Notes on the Uses of Bells among the Greeks and Romans* (Cambridge, 1904), Bertheld, *Enquetes campanaires* (Montpellier, 1904). See BELL RINGING.

BELL, SONG OF THE (*Lied von der Glocke*) The best known poem of Schiller, published in the *Musenalmannach* for 1800. In this poem the operations of casting the bell are correlated with the most important events in the whole course of human life. It is the highest development of Schiller's non-dramatic poetry, perfect in form, and embodying a very broad range of sentiment and conceptions.

BELL, ACTON The pen name of Anne Brontë.

BELL, ALEXANDER GRAHAM (1847-) An American inventor and scientist, distinguished for his invention of the telephone (qv). He was born in Edinburgh, Scotland, the son of Alexander Melville Bell. He received his education in Edinburgh and at London University, and in 1870, with his father, removed to Canada. He was greatly interested in his father's system of instruction of the deaf and dumb, and in 1872 he became professor of vocal physiology in Boston University. Soon thereafter he began experiments which led to the invention of the speaking telephone, and for this, on Feb. 14, 1876, he received a patent. Though his claims were opposed by other inventors, his rights to the invention were sustained by the United States Supreme Court, and he is now considered entitled to the credit of being the first to construct the instrument in a practical shape. In an imperfect form the telephone was exhibited at the Centennial Exposition of 1876 and was carefully studied by scientists from abroad. Further experiments led to the improvement of the apparatus, and a company was organized for its development. From this company, which has enjoyed an almost absolute monopoly of the telephone business in the United States, Professor Bell received large royalties and dividends. He was also the inventor of the photophone, used for the transmission and reproduction of sounds by waves of light, and of the graphophone, an

instrument which mechanically reproduces human speech. He has been active in scientific investigation, contributing liberally to geographical and aeronautical research. Several important aeroplanes were constructed through his interest, which also made possible much experimentation. Professor Bell has always maintained his interest in the instruction of deaf-mutes and has carried on and published important researches in this field, many of which have been published by the Volta Bureau, of which he was the founder. He was elected a member of the National Academy of Sciences in 1883, and in 1881 he received the Volta prize from the French government. He has served as president of the American Association to Promote Teaching of Speech to the Deaf, as president of the National Geographic Society, and as a regent of the Smithsonian Institution. In 1913 Dartmouth College conferred upon him the degree LL.D.

BELL, ALEXANDER MELVILLE (1819-1905) A Scottish-American educator, born in Edinburgh. From 1843 to 1865 he was a lecturer at Edinburgh University and in the latter year became lecturer at the University of London. In 1870 he became instructor in Queen's College, Kingston, Canada, whence, in 1881, he removed to Washington, D. C. He was the father of Alexander Graham Bell, and is best known as the inventor of so-called "visible speech" (qv), a system of instruction very successfully used in teaching deaf-mutes to speak. His publications include *Principles of Speech and Elocution* (1849), *Visible Speech: The Science of Universal Alphabets* (1867), *The Science of Speech* (1897), *Elocutionary Manual* (7th ed., 1899), *English Visible Speech and its Topography* (1904). See DEAF-MUTE, *Methods of Instruction*.

BELL, ANDREW (1753-1832) A Scottish educational reformer. He was born at St. Andrews and was educated at its university. From 1774 to 1781 he lived as a tutor in Virginia, but returned to Great Britain and took orders in the Church of England. In 1787 he went to India, where, within two years, he obtained appointments to no less than eight army chaplainships. While at Madras, in 1789, he was intrusted with the management of an institution founded by the East India Company for the education of the orphan children of the European military. As he found it impossible to secure properly qualified assistants, he at last resorted to the expedient of conducting the school with the aid of the pupils themselves. Hence originated the far-famed "Monitorial System" (qv). He superintended this institution for seven years, when the state of his health forced him to return to Europe. In 1797 he published a pamphlet entitled *An Experiment in Education, Made at the Male Asylum of Madras*, which attracted little attention until Joseph Lancaster published a tractate on education (1803) recommending the monitorial system and admitting Bell to have been its originator, an admission which he afterward retracted. In 1816 the Church founded the National Society for the Education of the Poor, and appointed Bell superintendent. He afterward became a prebendary of Westminster, and Master of Sherburn Hospital, Durham. He left £120,000 for the purpose of founding various educational institutions in Edinburgh, Glasgow, Leith, Aberdeen, Inverness, Cupar, and St. Andrews. Consult Meiklejohn, *An Old Educational Reformer*.

(Edinburgh, 1881), Fitch, *Educational Aims and Methods* (New York, 1900), Southey, *Life of Rev Andrew Bell* (London, 1844)

BELL, SIR CHARLES (1774-1842) A Scottish surgeon, anatomist, and physiologist, known for his discoveries in connection with the nervous system. He was born in Edinburgh, the son of the Rev William Bell, of the Episcopal church. In 1797 he became a member of the Edinburgh College of Surgeons and soon after was appointed surgeon to the Royal Infirmary. In 1804 he proceeded to London and lectured on anatomy and surgery at the academy in Great Windmill Street. He was admitted to the Royal College of Surgeons in 1812 and elected surgeon to the Middlesex Hospital. After the battle of Corunna in 1809 he visited the wounded who were landed on the southern coasts of England and housed in Haslar Hospital, and after the battle of Waterloo he had charge of a hospital at Brussels. In 1824 he was appointed senior professor of anatomy and surgery to the Royal College of Surgeons, London, and subsequently a member of the Council. On the establishment of the London University, now University College, in 1826, Bell was placed at the head of the department of medicine.

In 1829 he received the Royal Society's medal for his discoveries in science. In 1831 he was knighted by William IV. In 1836 he was elected professor of surgery in the University of Edinburgh. He was a fellow of the Royal Societies of London and Edinburgh and a member of other learned bodies. He wrote on surgery and the nervous system and edited jointly with Lord Brougham, Paley's *Evidences of Natural Religion*. Bell was one of the eight distinguished men selected to write the celebrated *Bridgewater Treatises*, his contribution being *The Hand Its Mechanism and Vital Endowments, as Evincing Design* (1834). Among his principal works are *The Anatomy of the Brain Explained in a Series of Engravings* (1802), *A Series of Engravings Explaining the Course of the Nerves* (1804), *Essays on the Anatomy of Expression in Painting* (1806), posthumous edition, much enlarged, entitled *The Anatomy and Philosophy of Expression as Connected with the Fine Arts* (1844), *A System of Operative Surgery* (1807-09, 2d ed, 1814), *Anatomy of the Brain* (1811), *Dissertation on Gunshot Wounds* (1814), *Anatomy and Physiology of the Human Body* (1816), various papers on the nervous system, in the *Philosophical Transactions*, *Exposition of the Natural System of the Nerves of the Human Body* (1824), *Institutes of Surgery* (1838), *Animal Mechanics*, contributed to the *Library for the Diffusion of Useful Knowledge* (1828), *Nervous System of the Human Body* (1830). Consult *Correspondence of Sir Charles Bell* (London, 1870).

BELL, CHARLES FREDERIC MOBERLY (1847-1911) An English writer and newspaper director, born in Alexandria, Egypt. Educated at a private school in Lancashire, England, he early returned to Egypt, where he became correspondent for the London *Times*. During this period he published three books *Khedives and Pashas* (1881), *Egyptian Finance* (1887), *From Pharaoh to Fellah*, a series of historical and descriptive sketches (1888). As correspondent of *The Times* he made himself thoroughly acquainted with the condition of Egyptian politics and was able through his letters to influence English public opinion. Among

other events he described the revolt of Arabi Pasha, the bombardment of Alexandria, and the campaign of Tel-el-Kebir. Presently, the affairs of *The Times* having fallen into a critical condition, Bell was recalled from Egypt to become manager of the paper. Due to his efforts, *The Times* was relieved of its embarrassments and put upon a basis of enlarged usefulness. In a second crisis, occurring in 1908, he also took a prominent part. Of the Times Publishing Co., Limited, which was then formed, he became managing director. Through his dealings with the staff of permanent and special correspondents abroad, Bell kept in close touch with the handling of news and the editorial department, as well as with the business interests of *The Times*. He is largely responsible for the successful effort to establish the legality of newspaper copyright not only on editorial matter but also on news writing. Among enterprises undertaken by him were the establishment of The Times Book Club, and the publication of *The Times Atlas* and *A History of the South African War*.

BELL, CLARK (1832-) An American lawyer and authority on medical jurisprudence, born at Whitesville, N. Y. Admitted to the bar in 1853, he became eight years later assistant district attorney of Steuben County in his native State. Later, as attorney of the Union Pacific Railway, he drew up the act which Congress passed to aid its construction. In 1883 he began a long service as editor and publisher of the *Medico-Legal Journal*. For 16 terms he was president of the Medico-Legal Society and was the founder of the American Congress on Tuberculosis. He was a delegate of the United States to the International Medical Congress at Paris in 1900 and to that held at Lisbon in 1906 and was made a member of many foreign as well as American learned societies. He is the author of *Bell's Medico-Legal Studies* (11 vols., 1893 et seq.), *Judicial History of the Supreme Court of the States and Provinces of North America* (1895 et seq.), *Spiritism, Telepathy, and Hypnotism* (1902, 2d ed, 1904).

BELL, CURRER The name under which Charlotte Brontë first wrote.

BELL, DIGBY (VALENTINE) (1849-). An American actor and comic-opera singer, born in Milwaukee, Wis. For a time he was engaged as a broker and as a steamship passenger agent, then he studied singing in Naples, where he took leading parts in operas. As an actor he made his first appearance at Malta in 1876. He returned to this country to sing in concert and in comic opera—touring the United States and Canada with Augustin Daly, the McCaul Opera Company, and the Duff Opera Company, and having especial success as the admiral in *Pinafore*, as Ko-Ko in *The Mikado*, and in the *Prates of Penzance* and *Patience*. He starred in *Tar and Tartan*, was for a while with Lillian Russell's company, in 1903 played Sam Weller in *Mr Pickwick* (with De Wolf Hopper), and in 1910-12 appeared in a notable revival of *The Mikado*.

BELL, ELLIS The pen name of Emily Bonte.

BELL, GEORGE JOSEPH (1770-1843) A Scottish lawyer, brother of Sir Charles Bell. He was born in Edinburgh and was admitted to the bar in 1791. Acknowledged one of the greatest masters of commercial jurisprudence of his time, and in particular of that department which relates to the laws of bankruptcy, he was in 1822

appointed professor of Scottish law in Edinburgh University, and in 1823 a member of the commission for inquiring into Scottish judicial proceedings. Subsequently he was a member of a commission to examine into and simplify the mode of procedure in the Court of Session. On the report drawn up by Bell was founded the Scottish Judicature Act, prepared by him, which effected many important changes in the forms of process in the superior courts of Scotland. Appointed in 1831 one of the clerks of the Court of Session, he was in 1833 chairman of the royal commission to examine into the state of the law in general. He also prepared a bill for the establishment of a court of bankruptcy in Scotland. His *Commentaries on the Laws of Scotland and on the Principles of Mercantile Jurisprudence* (1826, 7th ed 1870), attained the highest reputation, ranking with the *Institutes of Lord Stair*. He also published *Principles of the Law of Scotland* (1839).

BELL, HENRY (1767-1830) A Scottish engineer, who probably introduced steam navigation into Europe. He was born at Torphichen Mill, Linlithgow, and in 1783 was apprenticed to his uncle, a millwright. He was instructed in ship modeling at Borrowstounness and completed his knowledge of mechanics at Bell's Hill. Removing to London, he was there employed by the celebrated Rennie. About 1770 he returned to Glasgow and in 1808 removed to Helensburgh, where he kept the principal inn and devoted himself to mechanical experiments, chiefly with the steam engine. In January, 1812, a small vessel, called the *Comet*, with an engine constructed by Bell, was launched on the Clyde with success—the first on European waters. A monument has been erected to his memory at Duglass Point, on the Clyde. See **STEAM NAVIGATION**.

BELL, HENRY GLASSFORD (1803-74) A Scottish lawyer and author. He was born in Glasgow and studied at Edinburgh. In 1828 he founded the *Edinburgh Literary Journal*. He was admitted to the bar in 1832, was appointed sheriff-substitute of Lanarkshire in 1838 and in 1867 sheriff-principal. He was a president of the Athenæum, a founder of the Royal Scotch Academy, and a lecturer before the Philosophical Institution. He was considered the best Scottish mercantile lawyer of his time. His publications included a vindication of Mary, Queen of Scots (2 vols, 1828-31), *Summer and Winter Hous* (1831), *My Old Porripho* (1832)—both collected by Bell from the *Literary Journal*—and *Romances and Minor Poems* (1866).

BELL, HENRY HATWOOD (1807-68) An American naval officer, born in North Carolina. He entered the navy as midshipman in 1823, was for many years connected with the East India Squadron and in 1856 commanded a vessel of the squadron which destroyed the barrier forts, near Canton, China. In 1862 he was appointed fleet captain of the West Gulf Squadron and took a prominent part in the passage of Forts St Philip and Jackson and the capture of New Orleans. He was, for a time in 1863, in command of the West Gulf Squadron. In 1865 he was assigned to the command of the East India Squadron and in 1866 was promoted to be rear admiral. He was drowned at the mouth of the Osaka River, Japan.

BELL, HENRY THOMAS MACKENZIE (1856-) An English poet and critic, born in

Liverpool, March 2. He wrote several volumes of sincere verse. *The Keeping of the Vow* (1879), *Verses of Varied Life* (1882), *Old Year Leaves* (1883), *Spring's Immortality and Other Poems* (1896), *Pictures of Travel and Other Poems* (1898). In 1900 appeared a collection of his poems, edited by J. J. Nesbitt. Bell contributed to many periodicals, to the *Dictionary of National Biography*, and did notable critical and biographical work on Victorian authors, as in *Charles Whitehead* (1884, new ed, 1894), *Christina Rossetti* (4th ed, 1898), and later he published *Collected Poems* (1901), *John Clifford God's Soldier* (1908), *For God, and for the Commonwealth* (1909). In 1913 he edited the *China Year Book*.

BELL, JAMES FRANKLIN (1856-) An American soldier, born at Shelbyville, Ky. He graduated at West Point in 1878 and served on the plains with the Seventh Cavalry. He served in the Spanish-American campaign in the Philippines and against the natives. In 1903 he became commandant of the Infantry and Cavalry School and Staff College at Fort Leavenworth. He succeeded General Bates as chief of staff in April, 1906. After the San Francisco earthquake he had charge of the distribution of supplies and of the garrisoning of the ruined city. He was made a major general in 1907 and appointed commander of the Philippine division in 1911.

BELL, JAMES MONTGOMERY (1837-) An American soldier, born in Williamsburg, Pa. He graduated at Wittenberg College in 1862, entered the Federal army as first lieutenant of volunteers, and served throughout the Civil War. From 1866 to 1898 he served against the Indians on the frontier. In October, 1899, he was sent to the Philippine Islands, where in March, 1900, he was placed in command of the Third District of the department of southern Luzon, and in April was appointed Military Governor of the same district. He retired in 1901, with the rank of brigadier general.

BELL, JOHN (1691-1780) A Scottish traveler. He was born in Anternomy and was educated for the medical profession. In 1714 he went to St Petersburg and soon afterward was appointed physician to an embassy from Russia to Persia. In 1719 he was sent to China through Siberia and in 1738 went on an embassy to Constantinople, where he settled for some years as a merchant. In 1747 he returned to Scotland. His *Travels from St Petersburg to Various Parts of Asia* was published at Glasgow in 1763.

BELL, JOHN (1763-1820) Brother of Sir Charles Bell. A Scottish surgeon. He was born in Edinburgh, studied under the celebrated Black, Cullen, and Monro *secundus*, and while attending the anatomy classes of Dr Monro, first conceived the idea of teaching the application of the science of anatomy to practical surgery. He commenced in 1786 lecturing in Edinburgh on surgery and anatomy, and in 1793 published the first volume of his *Anatomy of the Human Body*. In 1797 appeared the second volume, and in 1802 the third. A volume of anatomical drawings, illustrative of the structure of the bones, muscles, and joints, was published in 1794, another volume on the arteries, illustrated by his brother Charles, appeared in 1801. In 1798 Bell attended the seamen of Lord Duncan's fleet wounded at Camperdown, and in 1800 he published a *Memorial*

Concerning the Present State of Military Surgery His *System of the Anatomy of the Human Body* and his *Discourses on the Nature and Cure of Wounds* (1793-95) were translated into German. Early in 1816 he was thrown from his horse, and his health declining, he went to Paris and thence to Italy. He died in Rome of dropsy. Besides the works mentioned, he was the author of *The Principles of Surgery* (1801-07, new ed. by his brother, Sir Charles Bell, 1826). A posthumous work, entitled *Observations on Italy*, was published (1825) by his widow.

BELL, JOHN (1797-1869). An American statesman. He was born near Nashville, Tenn., graduated at Cumberland College (now Nashville University) in 1814, studied and practiced law, and in 1817 was elected to the State Senate. He served in Congress from 1827 to 1841, for 10 years as chairman of the Committee on Indian Affairs. He supported General Jackson in the presidential campaign of 1832, but in 1834 joined the newly established Whig party and was elected as its representative, over James K. Polk, to the Speakership of the House. In 1841 he became a member of President Harrison's cabinet, as Secretary of War, but, with the rest of the cabinet, excepting Webster, resigned (September 11) on account of the rupture between President Tyler, who had succeeded Harrison, and the Whig organization. From 1847 to 1859 he was a member of the United States Senate. In 1860 he was nominated for the presidency by the Constitutional Union party (q.v.), and in the ensuing election received the electoral votes of Kentucky, Tennessee, and Virginia. At first, though strongly opposed to the policy of "coercion," he deprecated secession and seemed disposed to support President Lincoln, but he soon gave his adherence to the cause of the Confederacy and advised his State to withdraw from the Union.

BELL, JOHN (1811-95). An English sculptor, born at Hopton, Suffolk, and educated at the Royal Academy schools. His early work was vigorous and natural at a time when classical principles still held sway, but his power declined in later life. Among his statues are those of Lord Falkland and Sir Robert Walpole (1854) in St. Stephen's Hall at Westminster. One of his best-known designs is a monument to the Guards who fell in the Crimea, in Waterloo Place. Another is the Wellington Monument at the Guildhall. In decorative art he also distinguished himself. He was one of the sculptors of the Albert Memorial in Kensington Gardens, London, which was unveiled in 1873, his work being the group representing the United States directing progress of America. A large copy of this in terra cotta is in Washington.

BELL, JOHN-JOY (1871-). A Scottish journalist and author, born in Glasgow. Educated at the University of Glasgow, he became known soon after his graduation for activity in journalism and novel writing. His first book, *The New Noah's Ark*, was published in 1898. This was followed by several other books, until 1902, when his *Wee Mac Gregor* established his reputation as a new Scottish humorist in Great Britain and the United States. This book was followed by many others, among which may be mentioned *Misses McLeerie* (1903), *Wee Mac Gregor Again* (1904), *Joseph Redhorn* (1908), *Oh! Christina!* (1909), *The*

Kingdom of Dreams (1911), *The Best Man* (1911), *Courtin' Christina* (1913), and a dramatization of *Wee Mac Gregor*, in 1912.

BELL, JOHN KEBLE (1875-) An English novelist and playwright, born at Basingstoke, Hampshire. He was educated at Wantage and at Worcester College, Oxford. Beginning newspaper work in London on the staff of the Press Association, he was editor of the *Sketch* in 1902-04, and dramatic critic of the *Daily Mail* in 1904-08. Under the pen name of "Kemble Howard" he wrote the following plays: *Compromising Martha* (1906), *The Dramatist at Home* (1900), *The Girl Who Couldn't Die* (1911), *The Embarrassed Butler* (1912). His other publications and novels include *The Chequer Papers* (1901), *Love and a Cottage* (1903), *The God in the Garden* (1904), *Love in June* (1905), *Bachelor Girls* (1905), *The Cheeiful Knave* (1910), *One in the Family* (1911).

BELL, LILLIAN (MRS A. H. BOGUE) (1867-) An American author. She was born at Chicago, Ill., and when only eight years of age began her literary career. As a constant contributor to magazines and a writer of many books, she became well known. Over 600 author's readings, in all the principal cities of the United States, were given by her, and on a notable occasion, in 1907, she appeared with James Whitcomb Riley and John Fox, Jr. During a four years' residence abroad she traveled extensively. Among her writings are *Love Affairs of an Old Maid* (1893), *A Little Sister to the Wilderness* (1895), *The Instinct of Steppfatherhood* (1898), *The Expatriates* (1900), *Abroad with the Jummies* (1902), *The Interference of Patricia* (1903), *At Home with the Jardines* (1904), *Why Men Remain Bachelors, and Other Luxuries* (1906), *Concentrations of Bee* (1909), *Angela's Quest* (1910). Although popular, her work is marked by a certain crudity, which is, however, characteristic of a well-known type of Western writers, and is perhaps best exemplified in her novel *The Expatriates*.

BELL, SIR LOWTHIAN (1816-1904). An English manufacturer and politician, born at Newcastle-on-Tyne. He was mayor of Newcastle in 1854 and in 1862 member of Parliament for Hartlepool from 1875 to 1880, and in 1885 was created a baronet. He was the founder of the Port Clarence Iron Works, on the Tees, and wrote *The Chemical Phenomena of Iron-Smelting* (1872), in which he demonstrated the practicability of the hot-blast furnace, and showed how far furnace dimensions could be increased for the sake of fuel economy, and a *Report on the Iron Manufacture of the United States, and a Comparison of it with that of Great Britain* (1877).

BELL, ROBERT (1800-67). An Irish writer, the son of a magistrate. He was born in Cork, Jan. 16, 1800, and when very young obtained an appointment in a government department in Dublin. He was for a time editor of the government journal, *The Patriot*. In 1828 he removed to London and was appointed editor of *The Atlas* newspaper. In 1838, in conjunction with Sir Edward Bulwer Lytton and Dr. Lardner, he started *The Monthly Chronicle* and afterward became editor of it. In 1841 he retired from *The Atlas*. For Lardner's *Cyclopaedia* Bell wrote "The History of Russia" (1836-38) and *The Lives of the English Poets* (1839), completed Southey's *Naval History* (1837), left unfinished by the author, and wrote a con-

tinuation of Mackintosh's *History of England* (1853). At the London theatres three five-act comedies were produced by him. He was author, also, of a collection of tales, *Hearts and Altars* (1852), a novel, *The Ladder of Gold* (1856), *Life of Canning* (1846), *Outlines of China* (1845), *Memorials of the Civil War*, consisting of the Fairfax correspondence (1847), and *Wayside Pictures through France, Belgium, and Holland* (1858). But the work by which he is chiefly remembered is an annotated edition of the English poets (24 vols., 1854-57). He died April 12, 1867.

BELL, ROBERT (1841-) A Canadian geologist, born in Toronto, Ont. He studied at McGill University, and in 1857 was appointed to the staff of the Canadian Geological Survey, of which he became the senior member and assistant director. Throughout the Dominion he made very extensive topographical surveys and explorations. He was medical officer and geologist on the *Alexis* Expedition to Hudson Strait and Bay in 1885, in 1888-89 was a member of the commission appointed by the government of Ontario to report on the mineral resources of the province and in 1895 surveyed the Noddawai River (emptying into James Bay), the western and chief branch of which was named after him. In addition to this work he was also, in 1863-67, professor of chemistry and natural sciences in Queen's University (Kingston). He published upward of 180 papers and reports on topics connected with exploration, and the scientific and economic features of Canadian geology.

BELL, THOMAS (1792-1880) An English naturalist. He was born at Poole and died at Selborne. From 1816 to 1861 he lectured on dental surgery and comparative anatomy at Guy's Hospital, London. In 1836 he became professor of zoology in King's College, London. He was the author of several works on British animals, especially *History of British Quadrupeds* (London, 1837, 10v ed., 1874), and similar works on *Reptiles* (1839) and *Crustacea* (1853). He played an important part in the development of scientific societies in London. At the age of 70 he retired to Selborne, where he issued in 1877 a classical edition of White's *Natural History of Selborne*. His original scientific writings relate chiefly to fossil Chelonia and Crustacea. Consult *Nature*, vol. xxi, pp. 473, 499 (London, 1880).

BELLA, STEFANO DELLA (1810-64) An Italian designer and etcher. He was born in Florence, studied there and at Rome, and went in 1839 to Paris, where he remained until 1850. Besides executing many other works, he was commissioned by Cardinal Richelieu to engrave a "Siege of Arras." The remainder of his life was spent at Florence. He executed upward of 1400 different subjects—battles, sea-pieces, landscapes, and animals, all of which are characterized by freedom and delicacy and give evidence of high imagination and much careful manipulation. They are also of great value for the knowledge of the history of civilization in the seventeenth century. One of his most admired works is a view of the Pont Neuf, Paris (1846). His excellent drawings are often ascribed to Callot (q.v.), who exercised the greatest influence upon his art.

BELLABELLA. See KWAKUTUL.

BELLACOO'LA. A detached Salishan tribe, living upon the Bellacoola River, which empties

into Bentinck Arm, about lat 52° N., British Columbia. Their name is of Kwakutl origin. Epidemics and diseases introduced by the white men have now reduced the tribe to a few hundred souls.

BELLADON'NA (for derivation see below), DWALE, or DEADLY NIGHTSHADE (*Atropa belladonna*). A plant of the natural order Solanaceae. It is an herbaceous perennial, growing up every year as a bush, from 2 to 6 feet high, with ovate entire leaves, and bell-shaped flowers of a lurid purple color, which are larger than those of the common harebell, stalked and solitary in the axils of the leaves. It produces berries of the size of a middle-sized cherry, which, when ripe, are of a shining black color and of a sweetish and not nauseous taste, although the whole plant has a disagreeable, heavy smell. All parts of the plant are narcotic and poisonous, and fatal consequences not infrequently follow from eating its berries. Its roots have sometimes been mistaken for pansies. The name *Belladonna*, "fair lady," is supposed to have originated in the employment of the juice for staining the skin or from its power of dilating the pupils and giving a glistening appearance to the eyes. The name "dwale" is thought to be derived from the same root with the French *déuil*, "mourning"—an allusion to the same qualities that have obtained for the plant the appellation of deadly nightshade. Others assert that it comes from the Anglo-Saxon and is connected with the word "dull," on account of its stupefying effects. *Atropa* is from *Atropos*, one of the Fates. The other species of *Atropa* are South American. *Belladonna* owes its powerful effect on the animal system to the alkaloid atropine (qv). *Belladonna* is used in medicine in extracts both of the leaves and root. Externally as a plaster or liniment it relieves inflammatory pains and neuralgias. Internally it is of great value in relieving spasmodic affections of the respiratory passages, such as asthma, bronchitis, and whooping cough. On the intestines it acts as an antispasmodic, relieving colic and checking peristalsis. It is almost a specific in the nocturnal incontinence of children.

BELLADONNA LILY. See AMARYLLIS.

BELLAGIO, bel-lä'jō (It. *bello*, beautiful + *agio*, rest, repose, comfort). A village of the province of Como, north Italy, celebrated by historians, artists, and novelists. It is at the most beautiful point on Lake Como, where a wooded promontory separates the two arms of the lake (Map Italy, D 2). There is regular steamboat communication with Como and with Lecco, and the village contains excellent hotels, beautiful gardens, an English church, and many magnificent villas. Pop., 1901 (commune), 3538. 1911, 3776.

BELLAIRES, bel-lä'r'. A city in Belmont Co., Ohio, on the Ohio River, and on the eastern boundary of the State, 4 miles south of Wheeling, W. Va. It is also on the Baltimore and Ohio, the Cleveland and Pittsburgh Division of the Pennsylvania Railroad, the Cleveland, Lorain, and Wheeling, and the Ohio River and Western railroads (Map Ohio, J 5). Here the Baltimore and Ohio Railroad crosses the river on a fine iron bridge. The city has extensive manufactures of glass, steel, enamel ware, and iron. It is in a rich agricultural district, producing vegetables, fruit, coal, and clay. Bellaires adopted the Federal plan of government in 1910, and

owns its water works Pop, 1890, 9934, 1900, 9912, 1910, 12,946

BELLAMIJ, bē'l'a-mi, or **BELLAMY**, JA-KO-VUS (1757-86) A Dutch poet. He was born at Flushing (Vlissingen) and studied theology at Utrecht. He was a distinguished poet, and the revival of Netherlandic literature was due probably to his influence and that of Van Alphen. His principal works include *Gezangen myner Jeugd* (published under the pseudonym of Zelands, 1782, 2d enlarged ed under the name of Bellamy, 1790), *Vaderlandsche Gezangen* (1783-85). His most celebrated poem, "Roosje," appeared in the collection entitled *Proeven voor het verstand den smaak en het hart* (1784). A complete edition of his poems was published by Loosjes (1842).

BELLAMONT, bē'l'a-mōnt, or **BELLO-MONT**, RICHARD COOTE, EARL OF (1636-1701). A Colonial Governor of New York, Massachusetts, and New Hampshire, from 1697 to 1701. He became a member of the English Parliament in 1688, and in the same year was prominent as a supporter of William, Prince of Orange, who in 1689 made him Earl of Bellamont and appointed him treasurer and receiver general to Queen Mary. In 1695 he was appointed Governor of New York, and in 1697 received a commission as Governor of New York, Massachusetts, and New Hampshire, but did not arrive in America until the following year. He was expressly directed to suppress illegal trade and put an end to piracy, and in 1696, with King William's sanction, he organized a company which sent out Captain Kidd (q v) against the freebooters. By many, accordingly, Bellamont has been unjustly accused of having connived at Captain Kidd's own piracies, though it was he who finally arrested him and sent him to England for trial. Bellamont's rigid enforcement of the laws, his sympathy with the democratic as opposed to the aristocratic party, and his strict policy with regard to land grants aroused much opposition among certain classes in New York, though he was very popular in Massachusetts and in New Hampshire. He has been spoken of as "the first actual friend of the people and sympathizer with honest democratic forms of government who administered the affairs of New York under the English Crown." Consult Frederic De Peyster, *The Life and Administration of Richard, Earl of Bellamont* (New York, 1879).

BELLAMY, EDWARD (1850-98). An American journalist and author. He was born at Chicopee Falls, Mass., studied at Union College, and in Germany, in 1871 was admitted to the bar and in the same year became a member of the staff of the New York *Evening Post*. Subsequently he was a critic and editorial writer for the Springfield (Mass.) *Union* and with others established at Springfield the *Daily News*. His best-known work is *Looking Backward*, or, 2000-1887 (1888), which has had an extraordinary sale and has been translated into many languages. Although not written for such a purpose, the book was extensively received as a gospel of Socialism, and led to the organization of many Bellamy clubs, and of the Nationalist party, in the promotion of which Bellamy himself was active as a writer and lecturer. *Equality* (1897), the sequel to *Looking Backward*, is an inferior volume on similar lines. Bellamy further published sociological essays, short stories, and some longer works of fiction,

including *Dr Heidenhoff's Process* (1879), *Miss Ludington's Sister* (1884), and *The Duke of Stockbridge*, the last appearing three years after his death, which occurred on May 22, 1898, at Chicopee Falls. W D Howells has declared that in Bellamy America is "rich in a romantic imagination surpassed only by that of Hawthorne."

BELLAMY, GEORGE ANNE (c 1731-88). An English actress. She was born, by her own account, at Fingal, Ireland. "George Anne" was a name given by mistake for Georgiana. She was the illegitimate daughter of Lord Tyrrawley and was educated by him. Choosing, however, to live with her mother, she made the acquaintance of Mrs Woffington and other actors and was engaged at Covent Garden to play Monimia in *The Orphan* (November, 1744). Her success thereafter was rapid. Her Belvidera, in *Venue Preserved*, and her Desdemona were much admired. She participated in the rivalry for popular favor in *Romeo and Juliet* in 1750, playing with Garrick at Drury Lane, while Barry and Mrs Cibber played at Covent Garden. She was thought the more charming of the Julietes. Mrs Bellamy was extremely popular, and until she forfeited her character by her various liaisons, was received in the best society. She lost her beauty early, and her later life was unhappy, apparently through her own extravagance and reckless habits. Her last appearance was at Drury Lane May 24, 1785, in a benefit to herself, in which she was unable to act, but spoke a short address to the spectators. Consult *An Apology for the Life of George Anne Bellamy, late of Covent Garden Theatre, Written by Herself*, 6 vols (London, 1785), Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (New York, 1886), and Galt, *Lives of the Players* (London, 1831).

BELLAMY, JOSEPH (1719-90). An American theologian, born at New Cheshire, Conn. He graduated at Yale in 1735, was licensed to preach in 1737, and in 1740 became pastor of the Congregational Church of Bethlehem, Conn. He was prominent as an itinerant preacher during the "great awakening" of 1740-44. Subsequently he established in his parish a noted theological school, in which were trained many distinguished New England divines. As a pulpit orator he was by some esteemed the equal of Whitefield. As a writer he greatly assisted by his scholarship and logic in laying the foundations of what became known as the New England theology. His system of divinity was much like that of his friend and associate, Dr Jonathan Edwards. He received the degree of doctor of divinity from the University of Aberdeen. His publications include *True Religion Delineated* (1750), *The Nature and Glory of the Gospel* (1762), and *The Law Our Schoolmaster* (1762). His *Complete Works* were published in 1811-12 (3 vols, New York) and 1850 (2 vols, Boston, with a memoir by Dr Tryon Edwards).

BELL AND EVERETT PARTY. See CONSTITUTIONAL UNION PARTY.

BELLANGÉ, bē'l'an'zhā' (JOSEPH LOUIS) HIPPOLYTE (1800-66). A French battle painter. He was born in Paris, studied with Gros, and practiced first as a lithographer. His first marked success in painting was "The Return of Napoleon from Elba," exhibited in 1834. From 1837 to 1854 he was director of the museum at Rouen. His principal works are at Versailles,

in the Louvre, and in the provincial museums, as at Amiens, Bordeaux, Rouen. They are chiefly battle scenes and reveal remarkable insight into the human side of military life as well as a close familiarity with all the details of battle. The following may be cited as examples: "Battle of Fleurus" (1836), "Battle of Wagram" (1837), "Soldier Returning" (1842), "Kellermann's Charge at Marengo" (1847), "Passage of the Guadarrama" (1852), "Battle of the Alma" (1855), "Assault on Malakoff" (1859), "Two Friends" (1861), "Cuirassiers at Waterloo" (1865), "The Guard Dies," his last work (1866).

BELL ANIMALCULE. See VORTICELLA.

BELLARMINE, bēl'lar-mīn or -mēn. The name of a jug devised by the Dutch Protestants in ridicule of Cardinal Bellarmine. Its form was after the churchman's figure, and his face was on it.

BELLARMINE, bēl'lar-mīn or -mēn. In Italian form, BELLARMINO, bēl'lar-mē'nō, ROBERTO FRANCESCO ROMOLO (1542-1621). A Roman Catholic theologian. He was born at Monte Pulciano, in Tuscany, Oct. 4, 1542. He entered the order of Jesuits in 1560 and was distinguished among his confrères by the zeal with which he studied theology, the Church Councils, the Fathers, Hebrew history, and the canon law. In 1563 he gave lessons in polite literature and astronomy at Florence, and in rhetoric at Mondovì, 1564-67. In 1569, when he went to Louvain as professor of theology, he began that long controversy with "hectics" which formed the main business of his life. From 1576 to 1589 he was professor at the Roman College. Then he went to France and was in Paris at the time of the siege by Henry IV. In 1591 he was back in Rome and shared in the revision of the Vulgate. In 1592 he became rector of the Roman College. In 1599 he was made a Cardinal against his own inclination, and, though himself a Jesuit, he honorably sided with the Dominicans against Molina's view in a noted controversy. From 1602 to 1605 he was Archbishop of Capua. After the death of Clement VIII (1605) he declined promotion to the papal chair, but was induced by Paul V to hold an important place in the Vatican, where he remained until the time of his death, which took place in the novitiate house of the Jesuits, Sept. 17, 1621. In his work, *De Potestate Pontificis in Rebus Temporalibus* ('On the Pope's Power in Secular Matters'), he advocated the doctrine of the spiritual supremacy of the Pope over all kings. On this account the book was condemned as treasonable in Paris, Venice, and Mainz.

His chief work contains the disputations held in the Roman College, 1576-81, *Disputationes de Controversiis Christianæ Fidei adversus hujus Temporis Hæreticos* (3 vols., Rome, 1581, 4 vols., Prague, 1721, 4 vols., Mainz, 1842). These disputations are regarded by Catholics as the best arguments for their tenets. There can be no question of their merits with regard to erudition and adroitness in controversy, but such Protestant opponents, and he had many of them, as Gerhard, in his *Bellarmino Orthodoxus Testis* (Jena, 1631-33), and Dallæus tried to show that many of the conclusions are far from being sound or logical. Industry, clearness, and acuteness are the chief merits of Bellarmine's great work. He was also conspicuously fair and complete in his statement of his opponents'

positions. Among his other writings the most able is the *Christianæ Doctrinæ Applicatio*, originally written in Italian and now translated into all the European languages. Pope Urban VIII, at the instigation of the Jesuits, declared Bellarmine to be a "faithful servant of God", but his canonization as a saint has hitherto been opposed. Curiously enough, his autobiography (Rome, 1675; Louvain, 1753; Ferrara, 1762) stood in the way. The book had become very scarce when J. I. von Dollinger and F. H. Reusch reprinted it, *Die Selbstbiographie des Kardinals Bellarmine, lateinisch und deutsch, mit geschichtlichen Erläuterungen* (Bonn, 1887).

Among his famous controversies were those with James I. of England and the Scottish jurist William Barclay, of Aberdeen. His attitude towards the revolutionary scientific theories of his time was more moderate than is commonly supposed. He was a personal friend of Galileo, who dedicated one of his works to him. Nevertheless, as the most learned and important member of the Sacred College, he was compelled to warn the philosopher against unwarranted theological interpretations of the new Copernican theory. Bellarmine did not personally reject that theory, but he maintained that it should be received only as a theory until the scientific proof of it was complete and final. His works, edited by Justin Fèvre, were published in Paris (12 vols., 1873-74). Some of his writings have been translated into English, e.g., *The Seven Words from the Cross* (London, 1870). For his biography, consult J. B. Condeire (Paris, 1893).

BELLARY, bel-lā'rē, or **BALLARI**. The capital of the district of the same name in India, 380 miles southeast of Bombay and 270 miles northwest of Madras, in lat 15° 8' N and long 76° 59' E (Map India, C 5). It is an important junction of the railroads to Bombay and Goa, is one of the principal military stations in the presidency of Madras, and is connected by good roads with Belgaum, Bangalore, Hyderabad, and Madras. The fort, dating from the sixteenth century, stands on a rock 2 miles round and 450 feet high, and is supplied with water from tanks excavated in the solid granite. Besides the fort and adjacent cantonment, Bellary includes a native town with fine bazaars. It has a considerable trade in cotton and cotton cloth which is manufactured in the town. Pop., 1891, 59,500, 1901, 57,700, 1911, 58,247.

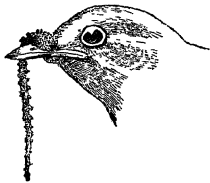
BEL'LASTON, LADY. A character in Fielding's novel, *Tom Jones*. She is the mistress of the hero and for some time supports him.

BELLAVITTS, bēl'lā-vē'tis, COUNT GRUSTO (1803-80). An Italian mathematician. He was born at Bassano, near Padua, and was for years professor of mathematical analysis at Padua. He contributed extensively to modern geometry and is especially known for his work in projective geometry and his method of equipollence. His published works include text-books of descriptive geometry (Padua, 1851, 2d ed., 1868), analytical geometry (Padua, 1870), and other valuable treatises.

BELLAY, bē'lā', JOACHIM DU (c.1524-60). A French poet, member of the Pléiade (qv), known as "The French Ovid." He was a cousin of Cardinal du Bellay, and was born in Paris of noble family, but poor and self-educated. His friendship with Ronsard dates from 1548 and led to his *La défense et l'illustration de la langue française* (1549)—an admirable piece of literary

criticism, followed by a collection (*Recueil*) of poems and another (*L'Olive*) of love sonnets (1550). He went with Cardinal du Bellay to Italy (1550), published a translation of two books of the *Æneid* (1552), returned after a mysterious love affair, in 1555, to Paris, where he became Canon of Notre-Dame, went to Venice, published poems, Latin and French (*Les antiquités de Rome*), in 1558, and his best collection, *Les regrets* (1559). He died as Archbishop-designate of Bordeaux while preparing *Les feux rustiques* for the press, at the height of advancing powers. In sublimity and pathos he is first in the Pléiade. Spenser translated 60 of his Roman sonnets into English (1591). The best edition of Bellay is by Marty-Laveaux (2 vols., 1866). Bellay's *Letters* are edited by Nohac (1883). There is a *Life* by Seche (1880). Consult Pater, *Studies in the History of the Renaissance* (London, 1888), and Seche, *Œuvres choisies avec notes* (Paris, 1894). A statue of Bellay was unveiled at Ancenis in 1894, with noteworthy addresses by Heredia and Brunetière.

BELLBIRD The English name of various tropical birds whose voices suggest the tones of a bell, specifically, a chatterer (family Cotingidae), called "campanero" by Spanish-speaking people of the lower Amazon and the Guianas, where it lives, and *Chasmorhynchus niveus* by ornithologists. It resembles the waxwings (Ampelidae) in form, but is pure white, and feeds mainly upon forest fruits gathered mostly in the high tree tops, where small flocks move about all day, but are by no means common, and at midday, when most other birds of the



AMAZONIAN BELLBIRD
Showing the caruncle

forest are silent, its note rings out "loud and clear like the sound of a bell. You hear his toll, and then a pause for a minute, then another toll, and then a pause again, and then another toll, and so on." So Waterton described it, others have likened the sound to blows upon an anvil, but all agree that it can be heard at an immense distance and is very striking. Another remarkable feature of this bird and its relatives, several of which live in South and Central America, and have more or less bell-like voices, are the fleshy appendages (*caruncles*) about the face, especially conspicuous in the present species. From its forehead depends a slender caruncle (see illustration), jet black but dotted all over with starlike tufts of feathers. It was long believed that this caruncle was concerned in the singular voice of the bird, because Charles Waterton (*Wanderings in South America*, London, 1825) asserted that it could be inflated from the palate and would stand erect like a rigid spire above

the beak to the height of 3 inches. This seemed plausible, but has been proved erroneous by observation upon birds kept in captivity, particularly about 1881 by J. J. Quelch, a naturalist of Georgetown, British Guiana.

"The caruncle," he says (*The Field*, London, Nov. 26, 1892), "is never carried upright. The erect position, in fact, is an impossible one, since the organ is made up of very fine elastic tissue, which causes it to depend lower and lower over one side of the beak during extension. When the bird is about to utter its characteristic notes, it slowly becomes elongated, at times as much as 5 inches. At the conclusion of the note the organ may remain extended until the next note, or may be partially retracted, but when a long interval takes place the structure is always allowed to shrink up to about half an inch or an inch in length, and it then hangs against the beak. During extension the caruncle is never inflated with air, but is always in a state of collapse." Quelch then adds a description of the curious behavior of the bird in uttering its ringing notes, which follow great draughts of air into its lungs. A related species of Costa Rica (*Chasmorhynchus tricauculatus*) has three of these elongated caruncles on the head—one on the forehead close to the base of the bill, and one at each corner of the mouth. A Brazilian species (*Chasmorhynchus nudicollis*) is white, with large spaces of naked skin about the eyes, beak, and throat, colored green.

In Australia one of the honey suckers (Meliphagidae) is called bellbird—a small greenish-yellow forest bird (*Manorhina melanophrys*), whose *ching-chang* from the tea-tree "scrub" is welcomed as an assurance that water is near. In New Zealand another honey sucker (*Anthus melanura*), now nearly extinct, is given the name for a similar reason, it is remarkable for decorating its thicket-hidden nest with the most gaudy feathers it can find.

BELL, BOOK, AND CANDLE The excommunication by bell, book, and candle was a solemnity belonging to the Church of Rome. The officiating ecclesiastic pronounced the formula of excommunication, consisting of maledictions on the head of the person anathematized, and closed the pronouncing of the sentence by shutting the book from which it was read, taking a lighted candle and casting it to the ground, and tolling the bell as for the dead. This mode of excommunication appears to have existed in the Western churches as early as the eighth century. Its symbolism may be explained by quoting two or three sentences from the conclusion of the form of excommunication used in the Scottish church before the Reformation. "Cursed be they from the crown of the head to the sole of the foot. Out be they taken of the book of life. And as this candle is cast from the sight of men, so be their souls cast from the sight of God into the deepest pit of hell. Amen." The rubric adds "And then the candle being dashed on the ground and quenched, let the bell be rung." So, also, the sentence of excommunication against the murderers of the Archbishop of Dublin in 1534. "And to the terror and fear of the said damnable persons, in sign and figure that they be accursed of God, and their bodies committed into the hands of Satan, we have rung these bells, erected this cross with the figure of Christ, and as ye see this candle's light taken from the cross and

the light quenched, so be the said accused murderers excluded from the light of heaven, the fellowship of angels and all Christian people, and sent to the low darkness of fiends and damned creatures, among whom everlasting pains do endure." See EXCOMMUNICATION

BELLE ALLIANCE, bél' a'lé-ans', LA (Fr fine union, beautiful alliance) A farm in the province of Brabant, Belgium, 13 miles south of Brussels. It is famous as the position occupied by the centre of the French army in the battle of Waterloo; June 18, 1815. The Prussians gave the name Belle Alliance to this decisive battle, the French named it from Mont-Saint-Jean, the key of the British position, about 2 miles to the north, while the English name, Waterloo (qv), is taken from the village where Wellington had his headquarters

BELLEAU, bē-lō', REXY (1528-77) A French poet, born at Nogent-le-Rotrou. He was a member of the Pleiade (qv), soldier, courtier, and tutor at the court of Lorraine. He made several translations from the classics (*Anacréon*, 1556) and published collections of descriptive and pastoral poetry with intermingled prose under the titles, *Petites inventions* (1557), *Bergerie* (1565), and *Amours et nouveaux échanges de pierres précieuses* (1576). His commentaries on Ronsard's *Amours* showed a remarkable range of classical learning and a delicate taste. He wrote also a rhymed comedy, *La reconnoissance* (*Recognition*), which shows humor and life and marks progress in the French stage. Belleau is the French Heriuck, picturesque, warm, but with a sweetness that dloys and without true taste or deep passion. His works have been collected by Gouveneur (3 vols, 1867) and by Marty Laveaux (2 vols, 1879)

BELLE CHOCOLATIERE, LA, la bēl shō'-kō-lā'tyā' A portrait by Jean Etienne Liotard (qv) of the Princess of Dietrichstein. Before her marriage the subject, Annette Beldaut by name and famous for her beauty, was a humble servant in a Viennese café. It is as such that she is represented in the picture. The latter now hangs in the Dresden Gallery

BELLECK' CHINA A fine grade of porcelain celebrated for its iridescent lustre. The body is Parian (qv), cast in the usual fashion, wet in a plaster mold, then glazed and fired. The lustre is obtained by the application of metallic washes, which are subsequently fired. The inventor of these lustres was a Frenchman, J. J. H. Brianchon, who obtained an English patent in 1857. Until the expiration of his patent they were imported from France. Belleck ware was first produced in England in 1858 by Walter Goss, at Stoke-upon-Trent, but it first became popular at the manufactory in Belleck, county Fermanagh, Ireland, whence its name. A remarkably delicate variety of this ware is known as "egg-shell Belleck"

BELLEFONTAINE, bēl'fōn-tān A city and the county seat of Logan Co., Ohio, on the highest ground in the State, 4 miles (direct) northwest of Columbus, on branches of the Cleveland, Cincinnati, Chicago, and St. Louis, the Ohio Electric, and the Toledo and Ohio Central railroads (Map Ohio, C 5). It has manufactures of carriage and automobile bodies, iron and steel bridges, harness, tools, mattresses, churns, shoe blacking, flour, and cement, and contains a large plant of the Cleveland, Cincinnati, Chicago, and St. Louis Railroad, including its yards and car shops. About 8 miles

from Bellefontaine is the well-known Lewiston reservoir, which has an area of 13,400 acres and a holding capacity of four and a half billion cubic feet. The city was settled in 1818. It is governed by a mayor, elected for two years, two directors, appointed by him, and a city council, elected by the people. There is an administrative board of education, elected by the people. Bellefontaine owns and operates its water works, gas and electric light plants, and sewage system. Pop., 1900, 6649, 1910, 8238

BELLEFONTAINE, BENEDICT A fine old character in Longfellow's "Evangeline," the father of the heroine. Of primitive simplicity, he was so devoted to his Acadie that he died of grief over the expulsion of his people

BELLEFONTE, bēl'fōnt', A borough and the county seat of Centre Co., Pa., 34 miles northeast of Tyrone, on the Pennsylvania, the Bellefonte Central and the Central of Pennsylvania railroads (Map Pennsylvania, F 5). It is a summer resort noted for its fine scenery and a famous spring, which, since its utilization in 1807, has not varied in its enormous outflow, abundantly supplying the borough. Pennsylvania State College is 12 miles from Bellefonte. The borough has a soldiers' and sailors' monument and a statue of war Governor Andrew G. Curtin. The large State Penitentiary, formerly at Pittsburgh, is now situated 4 miles from Bellefonte. The borough has large limestone quarries and limekilns and other important industrial interests represented by pig-iron furnaces, machine shops, match factories, a skewer, and a shirt factory. Settled as early as 1770, Bellefonte was incorporated in 1806. The government is administered by a chief Burgess, elected every three years, and nine councilmen. The water works are owned and operated by the borough. Pop., 1890, 3946, 1900, 4216, 1910, 4145

BELLEGARDE, bēl'gard' (Fr *belle*, fem of *beau*, beautiful + *garde*, protection) A fortress of the second class, perched on an isolated peak, 1380 feet above the sea, in the department of Pyrénées-Orientales, France. It commands the road from Perpignan to Figueras. Here the French under Philip III were defeated by Peter III of Aragon in 1285. It was captured by the Spaniards in 1674 and again by the French under Marshal Schomberg in 1675. After the Peace of Nimègue (1678-79) a regular fortress, with five bastions, was erected here by order of Louis XIV. In 1793 it was blockaded and taken by the Spaniards under Ricardos, but was retaken, 1794

BELLE HÉLÈNE, bēl' a'lēn', LA (Fr The beautiful Helen) An opéra bouffe, words by Meilhac and Halévy, set to music by Offenbach, and first given in 1864

BELLEISLE, bēl'ēl', CHARLES LOUIS AUGUSTE FOUQUET, DUC DE (1684-1761). A French soldier and statesman. He fought bravely in the War of the Spanish Succession (1702-13) and in 1718 against Spain. He became lieutenant general in 1732, took part in the War of the Polish Succession, and negotiated the treaty three years later whereby Lorraine was united to France. As Minister to Austria he showed himself a determined enemy of the Pragmatic Sanction and labored to bring the Elector of Bavaria to the throne. In the War of the Austrian Succession he captured Prague, but, finding himself unable to hold it, executed a masterly retreat to Eger (1742). In 1745 he was a prisoner in the hands

of the English, but was exchanged. He was made successively duke, peer, and lastly Minister of War. In this last capacity he introduced many useful reforms into the army organization, especially during the Seven Years' War. He was elected a member of the Academy. Consult *Mémoires du Duc de Belleisle* (London, 1760), and *Letters* (trans. London, 1759).

BELLE ISLE, bel' î', STRAIT OF The northern entrance to the Gulf of St. Lawrence from the Atlantic Ocean, separating southeastern Labrador from northern Newfoundland (Map Newfoundland, D 1). It is about 80 miles long and from 10 to 15 miles wide. It offers dangers to navigation, yet is traversed by ocean vessels, and lies on the shortest route from the St. Lawrence River to England. See also **BELLE ISLE, NORTH**.

BELLE-ISLE-EN-MER, bel'el'ân'mâr' (Fr.) beautiful island in the sea), known also as Guerveur. An island belonging to the department of Morbihan, France, in the Atlantic, 8 miles south of Quiberon Point (Map France, N, B 5). Its length is 11 miles and its greatest breadth 7 miles. Its climate is remarkably mild. Pop., about 10,000, chiefly engaged in pilchard and sardine fishing. Salt is also made on the island, and excellent draught horses are bred; agriculture is well developed. Its northern extremity is well known to Frenchmen as being Sarah Bernhardt's favorite holiday resort. The chief town is Le Palais, a seaport and fortified place. The island contains many interesting relics of antiquity and is of great interest historically. Admiral Hawke defeated the French fleet off Belle-Isle in 1759, and the English took the island in 1761. It was ceded to France by the Treaty of Paris in 1763.

BELLE ISLE, NORTH, or BELLE ISLE An island in lat 52° N, long 55° 20' W, near the middle of the eastern entrance to the Strait of Belle Isle, which separates northern Newfoundland from southeastern Labrador (Map Newfoundland, E 1). It is nearly 15 miles from either coast and has an area of about 15 square miles. At its southern extremity is a lighthouse with a fixed light, at an altitude of 470 feet, and visible for 28 miles. Below this light, at a height of 128 feet, is a second fixed light. A signal gun is fired every half hour in foggy weather.

BELLENDE, or BALLENDEN, or BALLENTYNE, JOHN A Scottish ecclesiastic, poet, and translator, born about the beginning of the sixteenth century. He was educated at St. Andrews University and in Paris, where he took the degree of D.D. at the Sorbonne. Bellen-den is best remembered by his translations of Boece's *Sootorum Historia* (done in 1533), and of the first five books of Livy (also done in 1533), interesting as specimens of the Scottish prose of that period and remarkable for the ease and vigor of their style. To both of these works are prefixed poetical prologues or prologues. Bellen-den's *Cronicles of Scotland* professes to be a translation of Boece, but is a very free one and contains numerous passages not to be found in the original, so that it is in some respects to be considered almost an original work. The author enjoyed great favor for a long time at the court of James V, at whose request he made these translations. As the reward for his performances he received grants of considerable value from the treasury and afterward was made Archdeacon of Moray and Canon of Ross. He opposed the Reformation

and, becoming involved in ecclesiastical controversy, left his country. According to Lord Dundrennan, Bellen-den was alive in 1587, but according to others he died much earlier. The translation or "traduction" of Livy was first published in 1822 by Mr. Thomas Maitland (afterward Lord Dundrennan), uniform with his edition of the *Cronicles*.

BELLENDE, WILLIAM A Scottish author in the time of Queen Mary and her son James VI. His personal history is obscure, all that we know is the testimony of Dempster (*Hist. Eccl.*) that he was a professor in the University of Paris and an advocate in the Parlement there, and that he was employed in that city in a diplomatic capacity by Queen Mary and also by her son, who conferred on him the appointment of Master of Requests. His first work, entitled *Ciceronis Princeps*, etc., was published in Paris in 1608, his next, *Ciceronis Consul, Senator, Senatusque, Romulus*, in 1612. Of these the first series aimed to collect all Cicero's remarks on royal government, the other dealt with government by the Consuls and the Senate. His next work, *De Statu Præci Orbis*, appeared in 1615 and consists of a condensed sketch of the history and progress of religion, government, and philosophy in ancient times. These three works he republished in a collected form the year after, under the title *De Statu Libri Tres*. His crowning labor, *De Tribus Luminibus Romanorum*, was published after his death (Paris, 1633). The "three luminaries" were Cicero, Seneca, and Pliny, out of whose works he intended to compile, on the same plan as his previous works, a comprehensive digest of the civil and religious history, and the moral and physical science of the Romans. The account of Cicero alone was completed and forms a remarkable monument of Bellen-den's industry and ability, and a treasure-house of the historical information to be drawn from Cicero. "Bellen-den," says Hallam, "seems to have taken a more comprehensive view of history, and to have reflected more philosophically on it, than perhaps any one had done before." Bellen-den's works furnished the materials for Dr. Middleton's *Life of Cicero*, though that learned divine makes no allusion to the forgotten Scot, whom he plundered wholesale. Warton first denounced the theft, which was afterward made clear by Dr. Parr, in his edition of *De Statu*, in three books, published in 1787.

BELLENZ See **BELLINZONA**.

BELLE PLAINE A city in Benton Co., Iowa, 90 miles northeast of Des Moines, on the Chicago and Northwestern Railroad (Map Iowa, E 3). It is the centre of a rich dairy district and has railway repair shops, a brick and tile factory, a brass foundry, a cannery, and a creamery. The water works are owned by the city. Belle Plaine was settled in 1862 and was first incorporated in 1879. Pop., 1900, 3283, 1910, 3121.

BELLEROPHON (probably from its resemblance to the helmet of Bellerophon. See **BELLEROPHON**). A genus of extinct gastropods of the order Aspidobranchiata. It is the type of the family Bellerophonidae, closely related on the one hand to the Pleurotomaridae and on the other to the Fissurellidae. The genus contains about 60 species, of which number one-half are American, the remainder European and Asiatic, and which range through rocks of Ordovician to Permian Age. The shells are globose,

symmetrically coiled in a single plane, with the whorls rapidly enlarging, and the aperture slightly expanded with a thickened margin. The outer margin of the aperture is somewhat sinuate and is provided with a small notch or slit, which is homologous with the slit of *Pleurotomaria* and which served for the passage of the siphons of the living animal. Extending backward from the slit along the median line is the "slit-band," which in some species is replaced by a keel. The genus did not attain any considerable prominence until Carboniferous time, when it became abundant. The best-known American examples are *Bellerophon crassus* and *Bellerophon precariatus*, both common in the coal measures of the Mississippi valley and the Southwest. A great number of species were formerly included under the name of *Bellerophon*, but more careful study has resulted in their distribution under several new generic names and even under other family names. See GASTROPODA.

BELLEROPHON (Gk Βελλεροφόντης, *Bellerophon*tes, slayer of Bellerus). The son of Glaucus, and grandson of Sisyphus, according to the narrative in *Iliad* vi. He was driven forth by King Prietus on account of the false accusations of his wife Antea, who had become enamored of him, but had been repulsed. Prietus sent him to Antea's father, Iobates, King of Lycia, with a sealed message, which advised his death. To accomplish this task, dispatched him against Solymi and the Amazons, both of whom he defeated, finally destroying an ambuscade set by Iobates to slay him. Satisfied of his bravery and innocence, Iobates gave him his daughter in marriage. Later writers modified the story in various ways. Bellerophon was transferred from Argos to Corinth and made son of Poseidon. He was also aided in killing the Chimæra by Athena, who enabled him to capture the winged horse Pegasus (qv). The Homeric version is evidently the hereditary story of the Lycian kings, to prove their Greek origin, but there is evidence in the coins of Corinth that the exploit of Bellerophon was at one time localized in Peloponnesus. Other stories represented him as fleeing to King Prietus because of the murder of his brother, Bellerus, and as later returning to take vengeance on the wife of Prietus, here called Sthenobea. In Homer, Bellerophon ends his life wandering in the Aleian Plain, hated by the gods, but Pindar tells how he tried to ascend to heaven upon Pegasus, but was dashed to the earth. This version was combined with the earlier by making Bellerophon fall upon the Aleian Plain, where he wandered blind and lame. Bellerophon's adventures formed the subject of a lost play by Sophocles, and of two lost plays by Euripides. In art Bellerophon is frequently represented with Pegasus alone, but more often in battle with the Chimæra. This scene is also found among the reliefs of the Heroon at Göl-bashi in Lycia. Bellerophon was worshipped as a god at Corinth and in Lycia. There seems good reason to see in him a sea divinity of the Argolid, like Poseidon, who later sank to the position of a hero. Consult Fischer, *Bellerophon* (Leipzig, 1851).

BELLERUS. A fabulous giant associated with Bellerum, the modern Land's End, Cornwall. In Milton's poem "Lycidas" Bellerus is a name for Land's End.

BELLE SAV'AGE (Fr *Belle Sauvage*, beautiful savage). One of the old London taverns, on Ludgate Hill. Built around a court, it was a capital place for an extemporized stage, the performance on which could be viewed from the balcony above. Dickens, in his *Picturesque Papers*, mentions it as the inn visited by old Weller.

BELLES-LETTRES, bël-lët'tër (Fr fine letters, from *beau*, fem *belle* + *lettre*). A term adopted into the English and various other languages. It is generally used in a vague way to designate the more refined departments of literature, but has in fact no precise limits. In English usage it is synonymous with another vague expression, "polite literature," including history, poetry, and the drama, fiction, the essay and criticism. It is sometimes used also for "the humanities." The term has no recorded use in English before 1710, when it was used by Swift in *The Tatler*.

BELLEVILLE, bël'vel' (Fr beautiful city). A former eastern suburb of Paris, now a part of that city, and largely inhabited by the poorer classes.

BELLEVILLE. The capital of Hastings Co, Ontario, Canada, on the Bay of Quinte, Lake Ontario, at the mouth of the Moira River, and on the Grand Trunk Railway, 113 miles east of Toronto (Map Ontario, F 3). It is an important dairy centre, there are iron foundries, cement works, potteries, planing and woolen mills, and there is trade in lumber and grain. Albert University, with separate colleges for men and women, St Agnes College (women), and the Provincial Deaf and Dumb Institute are located here. The city is the seat of a United States consulate. Pop, 1901, 9119, 1911, 9876.

BELLEVILLE, bël'vel' A city and the county seat of St Clair Co, Ill., 14 miles east by south of St Louis, Mo., on the Illinois Central, the Louisville and Nashville, and the Southern railroads (Map Illinois, C 5). It is the seat of a Roman Catholic bishop and contains the Belleville Fair Grounds, a public library, founded in 1836, St Elizabeth Hospital, St Vincent Hospital, and St John's Orphan Asylum. The city is in a productive agricultural and coal-mining region and is noted for its manufactories, which include stove works, iron and brass foundries, machine shops, a nail mill, tack works, glass works, shoe factories, brickyards, ice plant, distillery, breweries, and flour mills. Settled in 1814, Belleville was incorporated first in 1846. The government is vested in a mayor, elected biennially, who appoints all the important administrative officers, and a council. Pop, 1906, 18,756, 1910, 21,122.

BELLEVILLE. A town and the county seat of Republic Co, Kans., 219 miles west-northwest of Kansas City, on the Union Pacific and the Chicago, Rock Island, and Pacific railroads (Map Kansas, E 3). It is in an agricultural and stock-raising district and has grain elevators, flour mills, alfalfa mill, lumber yards, etc. The water works and electric light plant are owned and operated by the city. Pop, 1890, 1868, 1900, 1833, 1910, 2224.

BELLEVILLE. A town in Essex Co, N. J., on the Passaic River, the Morris Canal, and the Erie Railroad (Map New Jersey, D 2). It is a popular residential suburb of Newark, with which it is connected by electric roads, and has important manufactures of wire cloth, druggists' rubber supplies, metal goods, brushes,

dynamos, baking machinery, bicycle tires, brass-foundry and copper products, chemicals, etc. The town contains an Elks' Home and a public library. Pop, 1910, 9891.

BELLEVUE, bel'vu'. A city in Campbell Co., Ky., on the Ohio River, opposite Cincinnati, and on the Chesapeake and Ohio Railroad (Map Cincinnati and vicinity, F 5). The leading industries are the quarrying of sand, gravel, and loam. Settled in 1866, Bellevue was incorporated in 1871. Its charter provides for a mayor, elected every four years, and a city council of 8 members, elected biennially. Pop, 1890, 3163, 1900, 6332, 1910, 6683.

BELLEVUE. A city in Huron and Sandusky counties, Ohio, 15 miles south by west of Sandusky, on the Pennsylvania, the Lake Shore and Michigan Southern, the New York, Chicago, and St. Louis, the Lake Shore Electric, and the Wheeling and Lake Erie railroads (Map Ohio, E 3). It is in a fertile agricultural region, has large railroad shops, extensive limestone quarries, lumber yards, and canneries, and manufactures agricultural implements, ditching machines, soda fountains and fixtures, and stoves. The city contains a Carnegie library and a hospital and owns its water works. It has a unique sewage system made possible by a peculiar geological formation. The city is built over an underground stream that empties into Lake Erie, and each residence and business block has a hole about 100 feet deep drilled to the stream which disposes of both surface and sanitary drainage. Consult *Engineering News*, May 1, 1913, article by W. J. Sherman. Pop, 1900, 4101, 1910, 5209.

BELLEVUE. A borough in Allegheny Co., Pa., adjoining Pittsburgh, on the Pittsburgh, Ft. Wayne, and Chicago Railroad, and on the Ohio River. It is a purely residential town and contains the Suburban General Hospital and the Balph Memorial Park. Pop, 1890, 1418, 1900, 3416, 1910, 6323.

BELLEVUE, bel'vu'. 1 A chateau of Madame de Pompadour, near Sévres, only ruins of which remain. 2 The name of the celebrated municipal hospital of New York, for which buildings to cost \$12,000,000 are in process of construction (1913). See HOSPITALS.

BELLEW, HAROLD KYRLE (1857-1911). An English actor and playwright. The son of a clergyman of Calcutta, he was born in England. Of his early life, seven years were spent as a cadet in the British navy, after which he went to Australia, where he was an actor, a newspaper man, and a lecturer. He returned to England and made his debut at Brighton. He was soon well known in London in leading parts. His first appearance in America was in October, 1885, in *In His Power*, at Wallack's Theatre, New York, where during the following season he was leading man. He next year (1887) began his long connection with Mrs. James Brown Potter, with whom he played throughout the English-speaking world. Among his notable rôles were Leander to Mrs. Potter's Hero, in his own play, *Hero and Leander*, produced at the Shaftesbury Theatre, London (June, 1892), *Marat*, in *Charlotte Corday* (1895), and *Romeo*, which he played, with Mrs. Potter as Juliet, in New York in March, 1896, and later the same year in Australia. His best-known rôles here were Raffles and Brigadier Gerard in the two plays by these names. He died in Salt Lake City while on tour.

BELLEY, bē'lē'. The chief town of an arrondissement of the same name in the department of Ain, France, picturesquely situated in the interesting Val Romney, 18 miles northwest of Chambery (Map France, S, K 3). It is the seat of a bishopric and has a fine cathedral part fifteenth-century Gothic and part modern, an episcopal palace, a museum, and a public library. Lithographic stone, the best in France, is quarried and exported from the neighborhood, and it has silk and cotton industries. The ruins of a Roman temple attest the antiquity of Belley. Pop, 1901, 6467, 1906, 5707, 1911, 6182.

BELLFLOWER. See CAMPANULA.

BELLI, bel'lē, GIUSEPPE GIOACHINO (1791-1863). An Italian dialect poet, author of a famous collection of sonnets in the Roman dialect, *I sonetti romaneschi* (ed. by Morandi, 4th ed., Città di Castello, 1908). These sonnets are unsurpassed in their own peculiar vein. They are vivid realistic portrayals of Roman popular life in all its panoramic variety, presented with a truth and sincerity and a profound comic insight which makes each poem a masterpiece of its kind. They were mostly written between 1827 and 1839 and reflect occasionally the political turmoils of that time, usually from a conservative and Catholic point of view. Belli himself was much stimulated by the previous work of the Milanese poet Carlo Porta. His own success gave great impetus to the modern dialect school, represented by Luigi Ferretti, Augusto Marni, Renato Fucini, and Salvatore di Giacomo, of whom the two latter with Belli enjoy international fame. Consult for biography, D. Gnoli, *Studi letterari* (Bologna, 1883).

BELLIARD, bel'yar', AUGUSTIN DANIEL, COMTE (1769-1832). A French diplomat and soldier, born at Fontenay-le-Comte (Vendée). He served with distinction in the French army during the Revolution and was appointed brigadier general at the battle of Arcola. He was chief of staff under Murat, fought in the principal engagements of 1805, 1806, and 1807, and afterward became Governor of Madrid. He distinguished himself at Borodino and upon his recovery from a wound received at the battle of Leipzig was appointed commander in chief of cavalry. Although elevated to the peerage upon the accession of Louis XVIII, he rallied to the support of Napoleon upon the return of the latter from Elba and was sent as Ambassador to Naples, where, however, owing to the mistakes of Murat, he was able to accomplish little. After a varied career under the monarchy, he became the Ambassador of Louis Philippe to Brussels, where he signed the treaty separating Belgium from Holland. He also contributed greatly to the reorganization of the Belgian army. In 1836 a monument to him was unveiled in the city of Brussels. His autobiography was published in Paris, in 1842, under the title, *Mémoires du général Belliard écrits par lui-même*.

BELLIGERENT (Lat. *belligare*, to wage war, from *bellum*, war + *gerere*, to carry). In international law, a government actually at war. It is not necessary that a political community shall be independent in order to have the status of a belligerent, but it must be maintaining itself by regular hostilities or otherwise under a de facto government. When a state of war exists between sovereign powers, the rights and duties of the several parties, both as be-

tween themselves and as to neutral powers, are in general clearly defined. Modern usage requires that the existence of a state of war shall be made known to neutral powers by public proclamation (See DECLARATION OF WAR). As between the belligerent powers, the rules of modern warfare require that the lives and property of non-combatants shall be respected, forbid undue cruelty and the use of barbarous weapons and methods of warfare, and dictate that no more damage shall be inflicted than is necessary to obtain victory. Where an enemy's territory is occupied, the hostile authority may require the submission of the inhabitants and may lawfully exercise over them the police and taxing powers of the government. As regards neutrals, the tendency of modern international law is to relieve them, their ships, their goods, and their trade, as far as possible, from the dangers and inconveniences of the war and, on the other hand, to hold them strictly to a policy of complete abstention from the concerns of the warring states.

A more difficult question is presented when both parties to the struggle are not sovereign political communities, but one a colony in rebellion against the parent state, or a revolutionary section or party waging war against the general government. Unless the conditions are such as to bring about the international recognition of the rebellious party as a belligerent, it has no standing in international law, and its acts of war are technically acts of piracy. It has no belligerent rights and is not entitled to have its blockades respected or its vessels received in foreign ports. It is the recognition of an insurgent government as a belligerent by neutral powers which brings it within the protection of the laws of war. But this act must be carefully distinguished from recognition of the independence of the insurgent government. This implies that the parent state is unable to coerce the rebellious subject and carries with it a recognition of the latter as a sovereign power.

For the neutral state the question of the recognition of belligerency is one of expediency. Such recognition cannot be claimed by an insurgent as a matter of right. It may be conceded on purely selfish grounds, if the trade or other interests of the neutral call for such action, or it may be granted in response to the demands of humanity or of general international policy. But in order to be justifiable in international law, the recognition must rest upon certain accomplished facts, viz., the existence, in the rebellious community, of a stable, well-organized civil government, exercising de facto authority in a definite territory, and the existence of actual and serious hostilities, carried on by such constituted authority for a considerable period of time, though these need not be regular in character nor general in extent. If, in addition to all this, the insurrection is of a formidable character, and especially if it is of such a nature as to threaten the interests of neutral states, the case for recognition of belligerency may become so strong as to be conclusive. When an intestine struggle presents the aspect of a war between federated states, belligerent rights are usually accorded to both the contending parties impartially. The recognition of the Southern Confederacy by Great Britain and France in 1861, though strenuously opposed by the government of the United States, was undoubtedly proper and necessary.

The grant of belligerent rights to an insurgent government is not an unmixed blessing, even to the recipient, and it carries with it certain benefits to the other party to the contest. Its principal advantage to the former is the powerful moral support which it gains from international recognition. In addition to this, it acquires the substantial benefits, already alluded to, of protection by the laws of war, the recognition of its flag, the right to negotiate loans abroad, and, in general, a quasi-political status, though without diplomatic standing. On the other hand, the status of belligerency carries with it the obligation to observe the rules of civilized warfare, and it shifts the responsibility for damage caused to neutral commerce and to the citizens of neutral states from the sovereign party to the party in insurrection. Accordingly, in the American Civil War, Great Britain and France, having recognized the Southern Confederacy as a belligerent power, were unable to charge the Federal government with liability for injuries to their subjects inflicted by the Confederate government or by its citizens in the territory occupied by it, whereas the government of Turkey, which did not recognize the Southern States, was able to hold the United States responsible for the acts of its rebellious citizens.

Certain acts of war on the part of the sovereign or parent states in connection with rebellious subjects—as the establishment of a blockade of the insurgent ports, an exchange of prisoners, the enforcement of the rules of war as to the carriage of contraband goods by neutrals—constitute in international law an implied recognition by the former of the belligerent status of the latter, but this affects only the character of the struggle between the parties and does not in itself alter the relations of the insurgent government to neutral states, though it may afford a moral ground for international recognition. In practice, such recognition is usually effected by issuing a proclamation of neutrality, in which the rights of the combatants and the duty of neutrals in relation to them are briefly indicated. Consult Snow, *Manual of International Law* (2d ed., Washington, 1898), Wheaton, *Elements of International Law* (8th ed., Boston, 1866, 4th ed., London, 1904), and authorities referred to under the titles INTERNATIONAL LAW, NEUTRALITY, WAR.

BELLINCIONI, bel'lén-cho'ná, GEMMA (1866—). A celebrated Italian singer. She was born at Como, Aug. 18, 1866, and received her first instruction from her father, showing herself a most apt and promising pupil. After a few lessons from Corsi she made her debut at the age of 15 in Pedrotti's *Tutti in Maschera* at Naples (1881). Here the famous tenor Tamberlik heard her and was so much struck with her remarkable powers that he engaged her as prima donna for his extended tours of Spain and Portugal. Upon her return to Italy she soon was recognized as the greatest singer of her time and was in constant demand in all the principal cities. Her appearances all over Europe became a series of uninterrupted triumphs. With a soprano voice of unusual range and power, she came to be considered equally great as a coloratura and dramatic singer. In 1890 she created the part of *Santuzza* in Mascagni's *Cavalleria Rusticana* and contributed considerably to the sensational success of that work. Subsequently she was in special

demand by the more prominent Italian composers for the creation of new rôles, and in this capacity her name was associated with the success of many new operas. Various offers from managers for an American tour she refused.

BELLING, WILHELM SEBASTIAN VON (1710-79) A Prussian cavalry officer, born at Paulsdorf (East Prussia). He attained distinction in 1759-61 by his defensive operations against the Swedish army in Pomerania and Mecklenburg. In 1762 he became a major general, in 1776 lieutenant general, and 1778 appeared prominently in the War of the Bavarian Succession. It was by him that Blücher, then a cornet in the Swedish army, was taken prisoner at Kavelpass and persuaded to enter the Prussian service.

BELLINGHAM A city, port of entry, and the county seat of Whatcom Co., Wash., 97 miles north of Seattle, on the Great Northern, the Northern Pacific, and the Bellingham and Northern railroads, and on Bellingham Bay (Map Washington, C 2). It is the seat of a State normal school, has a parochial and two high schools, two business colleges, two free libraries, and two hospitals. The city is noted for its extensive lumber interests, and has large saw and shingle mills, logging companies, and wood-working factories. Salmon canning and brewing, milk condensing, and the manufacture of cement and cans are also important industries. Bellingham has an excellent natural harbor, which is entered by all Oriental and Pacific coast lines. The water works are owned by the municipality. The first settlement here was made in 1853. The city was founded in December, 1903, by the consolidation of Fairhaven and Whatcom. Pop., 1900, 11,082, 1910, 24,298.

BELLINGHAM, RICHARD (1692-1672) A Colonial Governor of Massachusetts, born in England. He was recorder of Boston (Lincolnshire, England) from 1625 to 1633, and in 1634 emigrated to America and settled in Boston, Mass. In 1635, and 12 times thereafter, he was Deputy Governor of the Colony, and for some time was Treasurer. He was elected Governor over Winthrop in 1641 and was reelected in 1654 and in 1665. In 1664 he was also chosen major general. In the same year he stoutly resisted the royal commissioners, who had ordered him to London to undergo an examination with regard to his official conduct, but he secured the good will of the King by the present of "a shipload of masts." He was a shrewd administrator, just and upright. In religious matters he was stern and intolerant, especially towards the Quakers. In his will he provided that his property should eventually be devoted to the support of "godly ministers and preachers," but this provision was annulled as being unjust to his family. He was the last survivor of the original patentees of the Charter. His sister, Anne Hibbens, was executed as a witch at Salem in June, 1656.

BELLINGSHAUSEN, bel'lingz-hou'zen, FABIAN GOTTLIEB VON—In Russian, FADDEI FADDEYEVICH BELLINGSHAUSEN—(1778-1852) A Russian admiral and explorer, born on the island Osel (belonging to Livonia). He was appointed an officer of the fleet stationed at Reval in 1797 and in 1803 participated in the first Russian circumnavigation of the globe. In July, 1819, he was assigned by the Emperor Alexander to the command of an exploring expedition to the south polar regions. With two corvettes, the *Vostok* and the *Murvy*, he

traversed the Antarctic Circle, discovered the island which he named Traversay, in December, 1816, and thence penetrated to lat 70° S, where he discovered and named Peter Island and Alexander Land. The expedition arrived at Cronstadt Aug 5, 1821. He took part in the military operations against Varna in 1828, was advanced to the rank of vice admiral, and was placed in command of the Russian Baltic fleet. Afterward he became admiral and military governor of Cronstadt, where a fine bronze statue, designed by Schroder, was erected to his memory in 1860. An account of his explorations was published in St. Petersburg in 1831.

BELLINI, bel'le-né A celebrated family of Venetian painters which exercised a determining influence on Venetian art.—Jacopo (c. 1400-70), the founder of the family, was the son of Niccolotto, a tinsmith of Venice. His master in painting was Gentile la Fabbrano (qv), then employed on the decorations of the Ducal Palace. In 1423-25 he accompanied his master to Florence, where he adopted the principles of the Renaissance, then just beginning its glorious course. Recent studies in the Venetian archives have removed the obscurity surrounding the remainder of his life. In 1436 he finished his vast fresco of the "Crucifixion" in the cathedral of Verona, which was destroyed in the eighteenth century. In 1437 he became a member of the "Scuola" (social religious guild) of St. John the Evangelist at Venice, of which he was dean in 1441. The guild assisted in providing a suitable dowry for his daughter Niccolosa, who married Andrea Mantegna in 1453 and gave him a commission for a cycle of 18 paintings in their great hall representing the life of Christ and the Virgin, for which he received final payment in 1465. In 1441 he was active at Ferrara and while there engaged in the celebrated contest with Pisanello (qv) for the best portrait of Lionello d'Este. Jacopo received the prize. Among other important commissions were the figure of St. Lorenzo Giustiniani (1456), the recently canonized Patriarch of Venice, in San Pietro di Castello, and the great altarpiece for the Gattamelata Chapel in Sant' Antonio, Padua (completed in 1460), in which he was assisted by his two sons. In 1466 he contracted for a wall painting in the Scuola di San Marco, and he is mentioned as dead in 1471. Only three signed pictures of Jacopo survive. "The Crucified One" in the Archbishop's palace in Verona, an early "Madonna" in the Venetian Academy, and a later one at Lovers. The best of all his Madonnas is one recently discovered by Ricci and now in the Uffizi. Another in the Louvre with a kneeling donor, perhaps Lionello d'Este, is supposed to be the portrait which won the contest at Ferrara. There is also an "Annunciation" in Sant' Alessandro, Brescia. From his sketchbooks have been identified a "Crucifixion" in the Museo Correr, Venice, "Christ in Limbo" in the Gallery of Padua, and an "Adoration of the Kings" in private possession, Ferrara. By far the most interesting of Jacopo's surviving works are two admirable sketchbooks, left as a precious heritage by his widow to his eldest son Gentile, and by him to his brother Giovanni. The earlier of these is in the British Museum, and the later and better preserved is in the Louvre. They show him as a good draughtsman and as an eager student of antique, perspective, and anatomy.

GENTILE, BELLINI (1429-1530), unquestion-

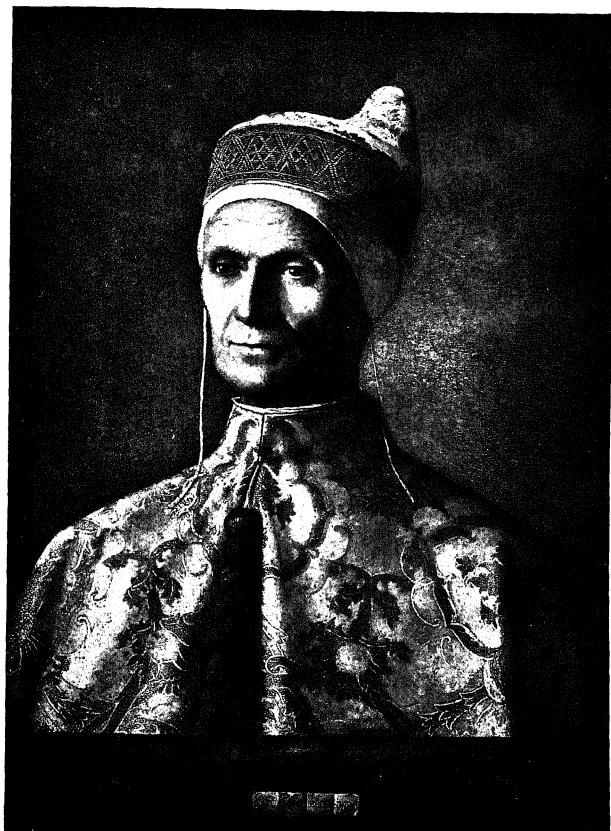
ably the elder son of Jacopo (though this has been disputed), was born in the early part of 1429, as appears from his mother's testament. His earliest works resemble those of his father in technique and in conception, but they also show strong influence of the Paduan school through his brother-in-law Mantegna. He assisted his father at Padua in 1460 and was commissioned to decorate the organ shutters of St Mark's, which still survive, in 1465 to paint a full-length portrait of the Patriarch Lorenzo Gustiniani, now in the Academy, and in 1466 two large pictures for the Scuola di San Marco, of which he afterward became dean. In 1469 he was made a count palatine of the Empire, and in 1474 official painter to the Venetian state, with the income of a broker's stall as salary, and commissioned to restore the decorations of Gentile da Fabbriano in the Ducal Palace. In response to the request of the Sultan that the Venetian government send him their best painter, he went in 1479 to Constantinople. He lived on intimate terms of intercourse with the Sultan, who on the painter's departure in 1480 created him *Bay* (*equus auratus*)—a title which henceforth appears on his paintings. Artistic mementos of this journey are still to be seen in his portrait of Mohammed II in the Layard collection, Venice, in the Oriental types and costumes which he thenceforth delighted to introduce into his pictures, and in a delightful water color portrait of a scribe, now in Mrs Gardner's collection in Boston. After his return to Venice he labored for many years on the great historic decorations of the Ducal Palace, representing in 20 or more paintings the important rôle played by Venice in the conflict between Pope Alexander III and Frederick Barbarossa. In these epoch-making pictures oil painting was for the first time used in Venetian mural decoration. At least six were by Gentile, these were all destroyed by fire, along with the portraits of the reigning doges, which it was his duty as state painter to depict. But replicas were often painted for the families of the doges, and of these, two, the portraits of Doges Mocenigo and Foscari, survive in Museo Correr, Venice. His chief surviving works, dating from the last years of his life, are pageant pictures, of which he was the first great painter in Venice. Three of these, painted for his father's guild, the Scuola di St John the Evangelist, representing the miracles wrought by a relic of the True Cross, are now in the Venetian Academy. Of especial interest is one showing St Mark's Place in its pristine glory in which is seen a stately procession of the guild members,—the doges, senators, and other Venetian dignitaries,—and another depicting how the holy relic miraculously floated in the water of the canal. His last work was the "Preaching of St Mark" (Brera, Milan), completed after his death by his brother Giovanni. All these pictures are filled with admirable specimens of contemporary portraiture, in which branch Gentile especially excelled. Other important portraits by him are Caterina Cornaro (Pesth) and "A Mathematician" (London). To a fine feeling for line Gentile united harmonious coloring, and he was especially strong in composition. He was a keen realist, and for his day the open-air effects of his pageant pictures are very remarkable.

GIOVANNI BELLINI (?-1516), the younger and seemingly illegitimate son of Jacopo, was the most important and influential member of

the family. Although he received his first instruction from his father, even his earliest works show a greater influence of his brother-in-law Andrea Mantegna and reveal a careful study of the sculptures of Donatello at Padua. Among these works are several Madonnas in private collections of Milan and three in the United States—in the Johnson collection of Philadelphia, the Davis collection, Newport, and the Metropolitan Museum, New York, "Christ on the Cross" and the "Transfiguration" in the Museo Correr, Venice, and, best of all, the "Agony in the Garden," National Gallery, London. At this time he painted many versions of the *Pieta*, the best of which are in the Ducal Palace, Venice, and in the Brera, Milan. The works of his early period are characterized by an austere and powerful realism and by profound depth of religious feeling, but after 1460 the characteristics of true Venetian painting prevail increasingly in his works. The color is softer and richer, and both line and sentiment are less austere. The *Pieta* continued to be a favorite subject, as may be seen in the three versions at Rimini and in the examples of the Berlin Gallery, the Mond collection, London. Of the Madonnas of this period the best is in the church of the Madonna dell'Orto, Venice. But the most important work of this second manner is the altarpiece of San Francesco, Pesaro (c 1470), now in the local Museum. The central panel represents the "Coronation of the Virgin," the sides four powerful saints, and the predella certain scenes from Holy Writ depicted in delightful landscapes.

This is the first of the great altarpieces to which he owes his principal fame. Most of them were painted between 1480 and 1490. In all the composition is similar: the Madonna enthroned in the apex of a church or else against the blue sky, on either side saints, and at the base angels. The decorative elements, even of the frames, are of great charm and in the purest Renaissance style. Such pieces are the great altar of Santi Giovanni e Paolo with 10 saints and angels, which was destroyed by fire in 1867, of San Giobbe, now in the Venetian Academy, with particularly fine angels, an oblong composition representing the Madonna with the Doge Barbarigo in San Pietro Martire, Murano, and the well-known triptych in the church of the Frati, Venice. The Madonna of this picture is one of his noblest and most ideal types, while the four admirable saints, Benedict, Nicholas, Peter, and Paul, vie in nobility of conception with Durer's four Temperaments (qv), and the frame is beautiful and harmonious. To the same period belong a number of his similar Madonnas, particularly the Madonna degli Alberti and the oblong Madonna with Saints Catharine and Margaret, three charming types of female beauty, both in the Venetian Academy. To this period also belong the delightful examples in Berlin and London.

Giovanni often worked in conjunction with his elder brother, and when in 1479 Gentile was sent to Constantinople, he took his place in the decoration of the Ducal Palace. In the earliest of these paintings (c 1479) he seems to have first tried the oil medium, used to such great advantage in the great altarpieces mentioned above. Most of his work in the Ducal Palace was done in the decade following 1490. He painted at least six subjects besides finishing one by Vivarini, all of which were destroyed by the calamitous fire of 1577. To the last years of



GIOVANNI BELLINI
THE "DOGE LEONARDO LOREDANO," FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

the fifteenth century belong also the charming allegories called the "Tree of Life," Venetian Academy, and "Santa Conversazione," in the Uffizi, with lovely landscape.

Early in the sixteenth century he resumed his great altarpieces with the "Baptism of Christ" in Santa Corona, Vicenza (1500-02), in that of San Zaccaria, in which the grand old master's art is rejuvenated in the new style of Giorgione (qv), and in the altar of San Giovanni Crisostomo, Venice, in the same new style. Mention should also be made of his last smaller Madonnas, like those in San Francesco della Vigna (1506) and in the Brera, Milan (1510), and of the only surviving example of his celebrated portraits, viz., Doge Loredan, in the National Gallery, London.

Giovanni Bellini is the most important figure in early Venetian painting and stands out most prominently as the head of the school. The qualities of painting known as distinctly Venetian—the combination of nobility of form with beautiful golden tone and soft melting color—first appear in his works. Throngs of pupils issued from his studios carrying his influence throughout the wide domains of the Venetian state, such as Bissolo, Catena in Italy, and Prevatali of the older generation, and among the younger practically every painter of importance, during the early High Renaissance, Giorgione, Titian, Palma Vecchio, and even those, like Lorenzo Lotto, who did not study under him.

Bibliography. The subject is ably treated in the following general works: Berenson, *Venetian Painters of the Renaissance* (New York, 1897), Venturi, *Le origini della pittura veneziana* (Venice, 1907), Gronau, "Jacopo, Gentile and Giovanni Bellini," in *Kunstlermonographien* (Bielefeld, 1909), a brief but excellent monograph. Jacopo's sketchbooks have been published with admirable comments by Ricci (2 vols., Florence, 1908), and also by Golubev (2 vols., Brussels, 1908). For Gentile and Giovanni Bellini the researches of Dr. Ludwig are important, published in the *Jahrbucher der koniglich preussischen Kunstsammlungen* (1902-1904), and elsewhere. For Gentile see Thuaume, *Gentile Bellini et le sultan Mohammed II* (Paris, 1888), for Giovanni the monographs by Fry (London, 1899) and Meynell (New York, 1906).

BELLINI, LORENZO (1643-1704). An Italian anatomist and physician. He studied medicine under Redi, was professor of anatomy at Pisa, and in Florence was physician to the Grand Duke Cosmo and also senior consulting physician to Pope Clement XI. Among his discoveries were the action of the nerves on the muscles and the uriferous ducts known as Bellini's tubes and described in his *De Structura et Usu Renum* (1662). He left also an original and curious book of poetry, the *Buccheriede* (1729).

BELLINI, VINCENZO (1801-35). A famous Italian operatic composer. He was born at Catania, Sicily, Nov. 3, 1801, and died at Puteaux, near Paris, Sept. 24, 1835. Born of a musical family, he entered the conservatory of Naples (1819), where he studied under Zingarelli. After writing various instrumental and choral compositions, he produced *Adelson e Salvini* (1824), the success of which was duplicated by that of *Bianca e Fernando* at the San Carlo, Naples (1828), and Bellini was engaged to write an opera for La Scala at Milan. After *Il Pirata*

(1827), he became one of the most popular composers in Europe, and his fame grew with each of the following operas: *La Straniera* (1828), *Capuleti ed I Montecchi* (1830), *Sonnambula* (1831), *Norma* (1831), *Beatrice di Tenda* (1833). He settled in Paris and gave himself up to the study of French music, diction, and verse, and then produced *I Puritani* (1835) at the Théâtre Italien, Paris. Its success eclipsed that of all his previous efforts. He was preparing for another work when death came unexpectedly at Puteaux, near Paris. All Europe mourned for him, and his funeral was an impressive pageant. A monument to Bellini was erected in Naples in 1836 and another in Catania in 1868, where his remains now rest. In 1901 the centenary of his birth was celebrated throughout Italy and in many European cities. A man of wide culture and deep refinement, of the elegant and sentimental type of Chopin, he had not the personal sorrows of the Polish master to make his grief morbid. His melancholy nature came into the world at the most opportune moment. Italy was groaning under foreign masters, *Norma* was but a lament over his country's bondage. His Druids and Gallic warriors were thinly disguised Italians of his time. The opera was a great advance on his previous works, which were criticised for the thin orchestration and lack of structural unity. He heeded the critics, and *Norma* may fairly be called a classic production. Wagner viewed it as such for its heroic grandeur, tragic power, and pathos, combined with an unequalled flow of melody and striking orchestration. *Norma* has been the favorite part of the greatest dramatic singers, such as Pasta, Viardot-Garcia, Jenny Lind, Burde-Ney, and Lilli Lehmann, the famous Wagnerian soprano. Bellini's muse is particularly grateful to the voice, and all famous singers, from Pasta and Viardot, through Schröder-Devrient and Johanna Wagner, down to Patti, Nilsson, and Sembrich, have kept his operas in their repertoires. Consult A. Pougin, *Bellini, ac vie, ses œuvres* (Paris, 1868), A. Amore, *Vincenzo Bellini* (Catania, 1892-94), G. T. Ferris, *Great Musical Composers* (New York, 1887), P. Voss, *Vincenzo Bellini* (Leipzig, 1901), W. A. Lloyd, *Vincenzo Bellini A Memoir* (London, 1908).

BELLINZONA, bël'in-tso'na, or **BELLENZ**, bël'lents. The capital of the canton of Ticino, Switzerland, on the left bank of the Ticino (Map Switzerland, D 2). The town is most picturesquely situated at an elevation of 775 feet above sea level and commands the St. Gotthard route. It was fortified by the Visconti in the Middle Ages, and modern defenses have been built near the entrance to the pass to protect the position of the town at the junction of the St. Gotthard Railroad with that to Locarno. Pop. 1910, 10,773.

BELLMAN, KARL MIKAEL (1740-95). A Swedish lyric poet. He was born in Stockholm, the son of a professor at Upsala, and began to write poetry at an early age, often composing the melodies for his songs. The favor of Gustavus III. relieved him from care, but he suffered from ill health, and on the murder of the King (1792) he was for a time a prisoner in the castle where he had been a frequent guest. His poems express the joy of life and occasionally a coarse revelry, but there is usually a cynic or pathetic undertone. Many of his poems were improvised at table, when Bellman would fall

into a sort of poetic trance. His more important works are collected in *Fredmans epistlar* (1790) and *Fredmans sänger* (1791). The best edition of his works is that of Carlen (Stockholm, 1861). His works are difficult to translate, but attempts have been made in German by Winterfeld (1865), Willatzen (1892), and recently by H. von Gumpenbug, *Bellman-brevier* (Jena, 1909). Consult Erdmann, *Carl Michael Bellman* (Stockholm, 1900), and F. Niedner, *Bellman, der Schwedische Anacreon* (Berlin, 1905), *C. M. Bellman* (Berlin, 1905).

BELLO, bé'lyó, ANDRÉS (1781-1865). A Spanish-American author, born at Caracas. In 1802 he was appointed Undersecretary of the government of Venezuela, and five years later, as a reward for his brilliant services, the King of Spain made him Venezuelan Commissioner of War, an honor at that time without a parallel. In 1810 he accompanied Bolívar and López Méndez in the capacity of secretary to London, to solicit aid for the South American insurgents. Here he held the position of Secretary of the Colombian, Venezuelan, and Chilean legations until 1829, when he returned to Caracas. Afterward he removed to Chile, where in 1834 he was appointed Secretary of State, and in 1843, when it was established, he became rector of the University of Santiago. In 1864 the United States submitted to his arbitrage a question pending in its relations with Ecuador, and in 1865 the republics of Peru and Colombia chose him as arbiter in a similar matter. His numerous and valuable works include the following: *Principios de derecho internacional* (1832, 1833), *Gramática de la lengua castellana, dedicada al uso de los Americanos* (1st ed., 1847, latest revised author's ed., annotated by R. J. Cuervo, Paris, 1874, with frequent subsequent revisions and reprints). This is the leading authority on the subject. His best creative work is a poem, *Selas americanas*, written while he was in England. His complete works were published by the Chilean government in 1881-03 (*Obras de Andrés Bello*, 15 vols., Santiago de Chile, reprinted in Madrid in the *Colección de escritores castellanos*). For an excellent biography, consult Miguel Luis Amunátegui (*Santiago de Chile*, 1882), A. Balbín de Unguera, *Andrés Bello, Su época y sus obras* (Madrid, 1910).

BELLOC, be-lók', HILAIRE (1870-) An English author, born in France of French and English parentage, educated in England at Edgoston Oratory School, and at Balliol College, Oxford. He served for a time in a French cavalry regiment. In 1906 he was elected to Parliament. Strong Roman Catholic convictions permeate his work, the most important part of which, well exemplified in *Danton* (1899, 1911), *Robespierre* (1901), *Marie Antoinette* (1912), and his continuation of Lingard's *History of England*, is historical. His books of travel, combining learning, sentiment, and a love of the open road, at once entertain and instruct, witness *The Path to Rome* (1902, 1910), and *Esto Perpetua* (1906, 1911). In his numerous essays—*On Nothing* (1908), *On Anything* (1910), *On Something* (1910), *This and That* (1912)—he is a writer of sound and sometimes brilliant prose. His novels have both merit and favor. The quality, quantity, and variety of his achievement make him a notable figure in contemporary letters. To works of this author named above, may be added *The Bad Child's Book of Beasts* (1896), *Paris* (1902, 1907), *The Pyre-*

nees (1909), *A Change in the Cabinet* (1909), *Veises* (1910), *The Green Overcoat* (1912), *The Book of the Bayeux Tapestry* (1913).

BELLOC, MARIE ADELAIDE. See LOWNDEN, MARIE ADELAIDE.

BELLO HORIZONTE, bel'lo ór'e-zón'ta. A city of Brazil. See MINAS.

BELMONT. See BELLAMONT.

BELL'ONA (Lat. from *bellum*, war). The goddess of war among the Romans. She was described by the poets as the companion, sister, wife, or daughter of Mars, she was also represented as armed with a bloody scourge and as inspiring her votaries with a resistless enthusiasm in battle. In the war with the Samnites, 296 B.C., the Consul Appius Claudius vowed a temple to Bellona, which was erected afterward on the Field of Mars. In this temple the Senate gave audience to embassies from foreign powers and also to consuls who had claims to a triumph which would have been nullified by entrance into the city. The priests of another (Asiatic) goddess of the same name were styled *Bellonari*, and practiced sanguinary rites, such as cutting their own arms or feet, and offering (or even drinking) the blood in sacrifice. Consult Fowler, *Roman Festivals* (London, 1899).

BELLONA'RII. See BELLONA.

BELLOT, bé'ló', JOSEPH RENÉ (1826-53). A French Arctic explorer, born in Paris. He was a lieutenant in the navy, distinguished himself in the French expedition against Tamatave in 1845 and joined an expedition in search of Sir John Franklin in 1851. During this expedition he accompanied a sledge party that reached the strait now bearing his name. In the expedition fitted out by the British Admiralty under Captain Inglefield, he sailed as a volunteer in HMS *Phaena*, but never returned, having been carried by a violent gust of wind, March 21, 1853, into a deep fissure in the ice. His *Journal d'un voyage aux mers polaires*, edited, with a notice of his life, was published at Paris in 1854.

BELLOT STRAIT. A narrow passage in the Arctic regions which separates North Somerset from the peninsula of Boothia Felix, and connects Prince Regent's Inlet with Franklin Channel (Map Arctic Region, E 7). Its east entrance was discovered by Kennedy during his search for Franklin, and named after his companion, the French Lieutenant Bellot, who lost his life there. The channel was later explored by McClintock. It is about 20 miles long and, at its narrowest part, about 1 mile wide, it lies nearly on the parallel of 72°, between granite shores, which, everywhere high, rise here and there to 1500 or 1600 feet. Through this funnel-shaped passage both the winds and the permanent currents and flood tides which come from the west have full play. **BELLOTTO**, bel-lót'tó, BERNARDO. See CANALOTTO.

BELLONS, bel'lóns. See BLOWING MACHINES.

BELLOWS, bel'vz, GEORGE (1882-). An American landscape, genre, and portrait painter. He was born at Columbus, Ohio, graduated from the State University in 1905, and studied painting in New York under Chase, Kenneth Miller, and Robert Henri. By the National Academy he was elected an associate at the age of 27. Though known chiefly as a landscape painter, he interested himself also in portraiture and the painting of figure subjects. His work, that of one of the younger and more radical group of American

painters, is characterized by breadth and boldness of handling. Among his most successful paintings are such subjects as "Up the Hudson," "Coast of Maine," "Club Night," and "Forty-Two Kids," a swimming scene. He is represented in the Metropolitan Museum of Art, New York, and the galleries of Brooklyn, Toledo, Cincinnati, and others of note throughout the United States. In the 1913 exhibition of the National Academy of Design he was awarded the first Julius Hallgarten prize.

BELLOWS, HENRY WHITNEY (1814-82). A well-known American clergyman. He was born in Boston, Mass., graduated at Harvard in 1832, and at the Divinity School in 1837, and in 1839 became pastor of the First Congregational Church (Unitarian, now All Souls) in New York. He acquired a great reputation as a pulpit orator and as a writer, and in 1846 established the *Christian Enquirer*, to which he was the chief contributor until 1850. With unusual literary taste and skill he combined practical and administrative ability of a high order, and as the chief promoter and president of the United States Sanitary Commission from 1861 to 1878, rendered a service of almost incalculable value to the country. (See *SANITARY COMMISSION*.) During the war he directed the expenditure of more than \$5,000,000 and the distribution of more than \$15,000,000 worth of supplies. He aided Peter Cooper in his plans for Cooper Union. The most noteworthy of his writings are *The Treatment of Social Diseases* (1857), *Restatements of Christian Doctrine* (1860), *The Old World in its New Face, Impressions of Europe in 1867-68* (2 vols., 1868-69).

BELLOWS FALLS. A village in the town of Rockingham, Windham Co., Vt., 114 miles northwest of Boston, Mass., on the Boston and Maine and the Rutland railroads, and on the Connecticut River (Map Vermont, D 7). The village is surrounded by mountains and is noted particularly for its falls, which, descending about 40 feet, generate an enormous amount of power, utilized by the various manufactories of the village. The principal of these are paper of many kinds, paper machinery, dairy tools and machinery, baskets, wall plaster, boxes, and men's shirts. Lumbering and general farming are also engaged in quite extensively. The village owns and operates its water works and contains the public library of the town, the Vermont Academy, a State armory, a hospital, a town meeting house, built in 1787, and a public playground. Settled in 1753, Bellows Falls was organized as a town in 1761 and incorporated as a village in 1833, it is now governed under a charter of 1906. The officers, elected annually, include a president, four trustees, a clerk, and a treasurer. Department officers are appointed by the trustees. "The Great Falls" was the scene of a great salmon-fishing industry among the Indians in Colonial days. They came here in large numbers at certain seasons of the year, and many battles between rival tribes resulted. Pop. 1900, 4337, 1910, 4883.

BELLOWS-FISH, bē'lūs-fish' See *GLOBE-FISH, SNIFE-FISH*.

BELLOY, bē'lwā', PIERRE LAURENT BUIRETTE DE (1727-75). One of the first French dramatists who ventured to introduce on the stage native, instead of classic heroes. He was born at Saint-Flour, in Auvergne, and educated for the law, but became an actor, under the name of Dormont de Belloy. For some years he re-

sided in St. Petersburg, where the Empress Elizabeth interested herself in him. In 1758 he returned to France, to superintend the production of his tragedy *Titus*. The piece proved a failure, and he returned to St. Petersburg. Afterward, however, he obtained a decided success in Paris by his tragedy of *Zelmire* (1762). In 1765 appeared *La Siège de Calais*, an historical and patriotic drama, which was immensely popular and is even yet held in esteem. In 1772 he was admitted to the French Academy, after the production of his *Gaston et Bayard*. This was followed by *Pierre le cruel*, which, though it failed at first, was afterward successfully revived. His collected works were published in 1779, edited by his friend Gaillard, who wrote his life. Consult *Godefroy, Histoire de la littérature française*, "XVIII^e siècle poètes" (Paris, 1879).

BELL RINGING. The ringing of bells in changes of regular peals is largely a European practice. It was early brought to a high degree of proficiency in the Netherlands. In some of its church towers the striking, chiming, and playing of bells is incessant, including the playing of regular tunes. In some instances, for this latter purpose, the bells are sounded by means of a cylinder, on the principle of a barrel organ, in others they are played with keys by a musician. The ringing of bells has become a distinct art also in Great Britain. According to the English method, the bell at each pull revolves round a complete circle and is under the full command of the ringer. The first known writer on the subject is the author of a book called *Tintinnalogia* (1668), said by some to have been Fabian Stedman, a Cambridge printer, who printed his changes on slips of paper in a notation of his own invention and taught them to his company in the tower of St. Benedict's Church, Cambridge. According to his account, there was no idea of change ringing until the beginning of the seventeenth century, though there certainly seem to be traces of it in the earliest English comedy, Udall's *Ralph Roister Doister* (1553). The art made rapid progress, and rings of bells increased from 5 or 6 to 10 or 12, the latter being the greatest number ever rung in peal. The variety of changes increases enormously with the increase in the number of bells. Six changes can be rung on 3 bells, on 4, four times as many, and so on until with 12 bells the enormous number of 479,001,600 different changes can be rung.

Bell ringing has an interesting system of nomenclature. The simplest peals are those called *grandsvre* on an odd number of bells, and *bob* on an even number. Changes on 3 bells are called *rounds*, on 4, *changes* or *singles*, on 5, *doubles* or *grandsvres*, on 6, *bobs minor*, on 7, *grandsvre triples*, on 8, *bobs major*, on 9, *grandsvre caters*, on 10, *bobs royal*, on 11, *grandsvre cinqueques*, on 12, *bobs maximus*. A bell is *set* when its mouth is turned upward, at *hand stroke* when set up so far that only the *tuffing* or *sallao* is held by the ringer, at *back-stroke* when rung so far round that the end of the rope is held. The *treble* bell is the highest, the *tenor* the lowest, of a set. Five thousand changes are a *peal*, any smaller number constitutes a *touch* or *flourish*, i. e., a practice rather than a performance.

It may be interesting to note here that the old-fashioned bell ringer has been banished from one of the most notable church chimes in Amer-

ica by those most modern of methods of power transmission, electricity and compressed air. The chimes of St Patrick's Cathedral in New York City consist of 19 bells, weighing from 270 pounds to 6000 pounds, and having a musical range from lower C to upper D, with the accompanying sharps and flats. These chimes were first played on Jan 1, 1901, from a keyboard in the sacristy, by means of a combination of electricity and compressed air, devised and constructed by Mr H C Champ, of Brooklyn, N Y. Consult Lomax, *Bells and Bellringers* (London, 1879), Ellacombe, *Practical Remarks on Belfries and Ringers* (London, 1859-60), Tyack, *A Book about Bells* (London, 1899), North, *English Bells and Bell Lore*, Raven, *The Bells of England* (London, 1906). See BELL.

BELL ROCK, or INCH CAPE. A reef of Old Red Sandstone rocks in the North Sea, 12 miles southeast of Arbroath, Scotland, nearly opposite the mouth of the Tay. The reef is 2000 feet long, at spring tides part of it is uncovered to the height of 4 feet, and for 100 yards around the sea is only 3 fathoms deep. Since 1810 it has been marked by a lighthouse 120 feet high. It was formerly a fruitful cause of shipwreck, and, according to tradition, the Abbot of Aberbrothock (Arbroath) placed a bell on it in the twelfth century. It is the scene of Southey's poem, *The Inch Cape Rock* (q v).

BELLS. A term used on shipboard, and nearly equivalent to the "o'clock" of ordinary life on land. The day is divided into 6 periods of 4 hours each, beginning at midnight. At half-past twelve 1 bell is struck, at one o'clock 2 bells, at half-past one 3 bells, and so on up to 8 bells at four o'clock. At half-past four it is 1 bell again, at five, 2 bells, and so on up to eight o'clock. Half-past eight is 1 bell, etc. The 6 periods nearly coincide with the *watches* (see WATCH) into which the day is divided, but not exactly, for the 4 hours from four to eight P.M. are divided into dogwatches of 2 hours each.

BELLS, THE. 1 The title of a poem by Edgar Allan Poe. 2 The name of the drama adapted by Leopold Lewis from Erckmann-Chatrian's *Le Juif polonais* and frequently presented by Sir Henry Irving. It deals with the murder of a Polish Jew by an innkeeper, from whose tavern he has just driven off in his sleigh. The innkeeper, Mathias, is so haunted by the recollection of his crime that the sound of the sleigh bells begins to ring in his ears and eventually drives him mad.

BELL-SMITH, FREDERIC MARLETT (1846-) A Canadian painter. He was born and educated in London, England, and afterward studied painting in Paris. In 1867 he came to Canada, settling at London, Ont., where he lived until 1888, when he removed to Toronto. He became successful not only in figure and portrait painting, but also in landscape work, his pictures of Rocky Mountain scenery taking high rank. In 1886 he was appointed a member of the Royal Canadian Academy of Arts, and in 1906 was elected president of the Ontario Society of Artists. Among his best-known works are "Lights of a City Life", "Landing of the *Blenheim*", with Sir John Thompson's Remains", "Queen Victoria's Tribute to Canada".

BELL'S PALSY. See FACIAL PARALYSIS.

BELL-TAINE. See BELTANE.

BELL-THE-CAT. A name given to Sir

Archibald Douglas, who, when certain Scottish lords were considering how to remove the upstart mason, Cochrane, from James III's favor, answered "That will I," to the inquiry, "Who will bell the cat?"

BELL TOWER. A tower built to contain one or more large bells in connection with religious or civil structures, a campanile (q v). The use of bells for calling religious or political gatherings, or announcing times and seasons, does not seem to have obtained in antiquity, public criers and heralds serving for that function. Small bells, rung by hand, were used, however, by the early Christians. It is certain that, while large towers were erected in connection with churches as early as the fifth and sixth centuries, the use of large bells suspended in towers did not become general until much later. Pope Stephen III (768-772) erected a bell tower with 3 bells at St Peter's, and Leo IV (847-855) did the same for St Andrew's at Rome, but at that time, and until the thirteenth century, bells were only of small or moderate size (See BELL). Even after bells were placed in towers, the latter continued to be designed, not primarily as bell towers, but rather as watchtowers, as in the original plan for the Monastery of St Gall. And even as late as the twelfth and thirteenth centuries there was a watchman's story or crow's-nest in church towers, above the belfry story. The mediæval bell tower was either a separate structure, as the round and square towers of the fifth and sixth centuries at Ravenna, or it was part of the façade, like the one or two towers at the end or ends of the façade at Shakka, Turmanin, and other churches of Syria. The type of the separate tower prevailed in Italy in its *campanili* (see CAMPANILE), the attached towers in the rest of Europe. The comparative freedom allowed in designing such structures, the rivalry in regard to their size and richness between monasteries and cathedrals, make of the church towers of the Romanesque and Gothic eras in some respects the most characteristic and finished product of each school. The pinnacled spires which are the most striking feature of the Gothic steeples, rising to a height of over 400 feet (Salisbury, Strassburg) and even 500 feet (Cologne, q v), are as typical of northern and western Europe as the square brick bell towers of Rome, Florence, Venice, and other Italian cities, flat-topped or crowned with a square pyramid of moderate height. The Renaissance developed types of its own, both for civic bell towers and steeples, among the most beautiful of which were those of Wren and Gibbs in England (1666-1754) and of the Colonial churches in America. See TOWER.

There are several other terms in use for constructions supporting bells *belfry* (q v), which is either a civic bell tower or the wooden frame supporting the bell, *bell gable*, a flat piece of wall or gable pierced with an opening for a bell, *bell cote*, a small steeple that does not break out much from the general design, *bell turret*, usually octagonal or circular, and of high, slender proportions, on a small scale.

BELLUNO, *bél-lū-nō* (anciently *Belunum*). An Episcopal city, capital of the province of Belluno, north Italy (Map. Italy, G 1). It is situated on a high tongue of land, at the confluence of the Ardo and Piave, 72 miles north of Venice. Noteworthy among its churches is

the cathedral, containing some excellent paintings. The campanile is 217 feet high. The chief manufactures are silk, straw, leather, and wax, the principal trade is in silk, lumber, wine, and fruit. Pop., 1881, 16,000, 1901, 18,747, 1911, 22,342.

BELLUNO, DUKE OF. See VICTOR, CLAUDE PERRIN.

BELL/WORT. See CAMPANTULA.

BELMONT. A village in Mississippi Co., Mo., on the Mississippi River, opposite Columbus, Ky., and on the St. Louis, Lion Mountain, and Southern Railroad (Map Missouri, G 5). In the summer of 1861 Belmont became the site of a Confederate camp. On November 7 General Grant, then in command at Cairo, Ill., moved upon it with about 3000 troops, and after four hours of fighting captured and destroyed it. Meanwhile General Polk sent General Pillow with a Confederate reinforcement across the river, and Grant was forced to fight his way back to his transports. The total Confederate force engaged was about 7000. The losses in killed, wounded, and missing were, for the Federals, 485, and for the Confederates, 642.

BELMONT. A village and the county seat of Allegany Co., N. Y., 93 miles west by north of Elmira, on the Erie and Buffalo and Susquehanna Railroad, and on the Genesee River (Map New York, B 6). It is the centre of an agricultural community and has flour mills and manufactures of jewelry and condensed milk. The city also contains a public library and a high school which includes a school of agriculture, maintained by the State. The water works are owned by the village. Pop., 1890, 950, 1900, 1190, 1905, 1207, 1910, 1094.

BELMONT, AUGUST (1816-90). An American financier. He was born in Alzey, Germany, was for several years employed in the banking house of the Rothschilds at Frankfurt and Naples and removed to New York as their representative in 1837. He was Consul General for Austria from 1844-50 and in 1853 was appointed by President Pierce chargé d'affaires at The Hague, where he afterward became Minister Resident, resigning in 1858. He was interested in politics and was chairman of the Democratic National Committee from 1860 to 1872. He was prominent on the turf and as a patron of art and owned a fine collection of paintings.

BELMONT, AUGUST (1853-). An American banker, born in New York City. He graduated at Harvard and immediately became associated with the New York banking firm of August Belmont & Co., founded by his father. Upon the formation of the Interborough Rapid Transit Company of New York City he became its president. He was chosen president of the National Civic Federation, in 1905, to succeed Senator Hanna (qv) and was reelected in 1906. In November, 1905, he was appointed treasurer of the Democratic National Committee.

BELMONT, PERRY (1851-). An American lawyer, son of August Belmont. He was born in New York, graduated at Harvard in 1872, and at the Columbia College Law School in 1876, was admitted to the bar and practiced law in New York until 1881. He was a member of Congress as a Democrat in 1881-87, was chairman of the Committee on Foreign Affairs in 1885-87, and was United States Minister to Spain in 1887-88.

BELMONTET, bel'mon'tá, LOUIS (1799-1879). A French poet and publicist. He was

born at Montauban, of Italian parents, and was educated at the Lyceum of Toulouse. In consequence of several eulogistic verses written by him on Napoleon I he was banished from Toulouse in 1819 and went to Paris, where he obtained a position as tutor. He later became one of the most ardent promoters of the Bonapartist propaganda, in which cause he in 1830 established the *Tribun du Peuple*. He was a member of the legislature from 1852 until the fall of the Empire. His most celebrated poetic productions are *Les tristes*, a collection of elegies (1824), *Le souper d'Auguste* (1828), *Une fête de Néron*, a tragedy performed more than 100 times at the Odéon in 1820.

BELOCH, ba'log, JULIUS (1854-). A German-Italian historian, born at Petschendorf, near Luben. He became professor in the University of Rome in 1879. His works include *Campamen* (2d ed., 1890), *Der italische Bund unter Roms Hegemonie* (1880), *Die attische Politik seit Perikles* (1884), *Die Bevölkerung der griechisch-römischen Welt* (1886), *Storia greca* (2 vols., 1893-97).

BELOIT. A city and the county seat of Mitchell Co., Kans., 184 miles west of Atchison, on the Missouri Pacific and the Union Pacific railroads, and on Solomon River (Map Kansas, D 2). It is the seat of the State Industrial School for Girls and contains a fine county courthouse, an opera house, a handsome post-office building, and a library. The city has a large trade in live stock, building stone, agricultural produce, grain, and flour. There are grain elevators and a large flour mill. The water works and electric light plant are owned by the city. Pop., 1900, 2359, 1910, 3082.

BELOIT. A city in Rock Co., Wis., 67 miles (direct) southwest of Milwaukee, on Rock River, and on the Chicago, Milwaukee, and St. Paul and the Chicago and Northwestern railroads (Map Wisconsin, D 6). It has paper mills, foundries, and extensive manufactures of iron, gasoline engines, windmills, agricultural implements, tools, wood-working and paper-mill machinery, scales, shoes, etc. Beloit has a public library and is the seat of Beloit College (Congregational), organized in 1847. The first settler on the site of Beloit came in 1824, and a city charter was obtained in 1856. The government, under a charter of 1896, is vested in a mayor, elected biennially, and a council. Pop., 1890, 6315, 1900, 10,436, 1910, 15,125.

BELOIT COLLEGE, at Beloit, Wis., was founded in 1848, graduates of Yale being prominent in its organization. The value of buildings and grounds is about \$610,000, the endowment amounts to \$1,240,000, and the annual income is about \$105,000. The number of volumes in the library is 50,000. In 1913-14 the faculty numbered 35 and the student body 387. No special students are admitted, and there is no academy in connection with the college. Aaron L. Chapin, D.D., LL.D., was president of the college from 1850 to 1886, Edward Dwight Eaton, D.D., LL.D., after 1886.

BEL/OMAN/CY. See SUPERSTITION.

BELON, be-lon', PIERRE (1517-64). A French naturalist. He was born at Soulethère, studied medicine in Paris, and traveled extensively. He published accounts of his travels in the following works: *Les observations de plusieurs singularités et choses mémorables trouvées en Grèce* (1551), *Judée, Egypte, Arabie, et autres pays étranges, rédigées en trois livres* (1553-58),

Histoire naturelle des étranges poissons marins (1551), *Histoire de la nature des oiseaux, avec leurs portraicts gravés en bois, plus, la vie peinture et description du Dauphin et de plusieurs autres rases de son espece* (1555) This last-named book is the most important treatise on ornithology of the sixteenth century. Belon paved the way for modern comparative anatomy.

BELOOCHE See BALUCHI

BELOOCHISTAN, be-loo'che-stan' See BALUCHISTAN

BELOS/TOMATIDÆ A family of predaceous water bugs. See FISH KILLER

BELOT, be-lô', ADOLPHE (1829-90) A French novelist and dramatist. He was born at Ponte-à-Pitre, Guadeloupe, Nov. 6, 1829, and early began to devote himself to writing. He was a most prolific and sensational author, and in addition to original plays he dramatized, often in collaboration with others, nearly all of his own novels. Among his best-known novels are *Le diamant de la Rue de la Paix* (1867), *La Venus de Gordes* (1867), in collaboration with Ernest Daudet, *Mademoiselle Guélaud, ma femme* (1870), a study in perverse pathology and highly meretricious, *La femme de feu* (1872), *La Venus naute* (1878), *Fleur de crime* (1881). His comedies, *Le testament de César Guodot* (1859), written with Edmond Villette, *Les mœurs d'un système* (1882), and *Les indifférents* (1883), were widely popular, but Belot will perhaps be longest remembered by his dramas *Paricide* (1874), and *Saphô* (1885), written in collaboration with Alphonse Daudet. He died in Paris, Dec. 17, 1890.

BELOVED DISCIPLE, THE A name given to St. John, called in John xiii 23, "one of his disciples, whom Jesus loved."

BELOVED PHYSICIAN, THE A title of St. Luke in Col. iv 14.

BELPER (corrupted from *Fi bel, beau*, beautiful + *repaire*, retreat) A market town of Derbyshire, England, on the Derwent, 7 miles north of Derby (Map England, E 3). It is well built, in great part of gritstone, which is obtained in the neighborhood. Belper owes its prosperity to the establishment of cotton works in 1776, and these are run by water power. There are also manufactures of silk and cotton hosiery, linen, and pottery. Coal and lead are found in the vicinity. Belper was at one time the residence of John de Gaunt. Pop., 1891, 10,400, 1901, 10,900, 1911, 11,640.

BELPHEGOR (Gk *Βελφεγγορ*, *Beelphegor*, for Heb *Bagl-Peor*, lord of Peor mountain.) The name of an arch demon who entered into a marriage with a mortal, but was not able to endure the society of the woman and fled. La Fontaine treated this subject in one of his *Contes*, and Wilson produced an English tragedy, *Beelphegor, or the Marriage of the Devil*, in 1691. Two other plays of this name have been brought out since. In the pantheon of the Moabites a deity of this name was worshipped with peculiarly disgusting rites.

BELPHEGE (Fr *belle*, fem of *beau*, OF *bel*, beautiful + *Lat Phœbe*, Gk *Φοῖβη*, *Phoibe*, Diana.) A character in Spenser's *Fæerie Queene*, who sums up Elizabeth's womanly attributes. The virtues of the Queen are set forth under the other name of Gloriana.

BELSHAM, THOMAS (1750-1829) An English Unitarian clergyman, one of the ablest expounders of that system of theology. He was born at Bedford, was educated in the principles

of Calvinism, and was pastor of the Dissenting congregation and head of the theological academy at Daventry from 1781 to 1789, when he resigned, on embracing Unitarian views, and shortly after received the charge of a new theological academy at Hackney. After the collapse of that institution for want of funds in 1796, he took private pupils. In 1805 he removed to London as the successor of Dr. Disney, where he continued till his death, Nov. 11, 1829. Most of his works are controversial, his doctrine regarding the person of Christ represents the purely "humanitarian" view, as distinguished from the more nearly Arian sentiments of men like Channing. He published also a work on mental and moral philosophy, following Hartley, and a memoir of his predecessor, Theophilus Landsey (1812, reprinted Boston, 1873). Consult *Memoirs*, ed. by J. Williams (London, 1883). His brother, WILLIAM (born 1752, died 1827), was an active and voluminous writer of history and political tracts on the side of the Whigs. He wrote *History of Great Britain from 1688 to 1830* (14 vols., London, 1805-24).

BELSHAZZAR (Babylon *Bel shar-usur*, O Bel, protect the king, from *shar*, lord, king + *usur*, to protect). According to the Book of Daniel (chap. v), the son and successor of Nebuchadnezzar, and the last King of Babylon, who was slain, the Empire passing into the hands of Darius, the Mede. He is warned of his doom by a mysterious handwriting that appears on the wall of his palace. Those who accept the results of modern biblical criticism maintain that the Book of Daniel was composed in 165 B.C. If this is granted it is hardly astonishing that in a composition made several centuries after the fall of Babylonia historical events should have become confused in the mind of a writer who merely introduces Babylonian personages as a disguise, and is interested, not in Babylonian, but in Hebrew events. As a matter of fact, the last King of Babylonia was Nabonidus, in the seventeenth year of whose reign (B.C. 539) Babylon was taken by Cyrus. The inscriptions of Nabonidus, however, make mention of a son, Bel-shar-usur, and this name also occurs as that of the son of Nabonidus in several contract tablets, and since, in an inscription of Cyrus, "a son of the King" is spoken of as in control of the army in northern Babylonia, it is reasonable to conclude that Bel-shar-usur was associated with his father in the government. Thus the tradition could arise which would make him the actual last King of Babylonia. The association of Belshazzar with Nebuchadnezzar rests upon a further confusion which can be easily accounted for, if it be borne in mind that a Jewish writer of the second century B.C. would not be at great pains to distinguish one Babylonian King from another. Nebuchadnezzar, as the destroyer of Jerusalem, was the chief representative, in the eyes of a Jewish writer, of the Chaldean monarchy, and so appears throughout the Book of Daniel.

Consult A. Bevan, *The Book of Daniel* (1892), J. D. Prince, *The Book of Daniel* (1899), K. Marti, *Das Buch Daniel* (1901), S. R. Driver, *The Book of Daniel* (1900), R. H. Charles, *The Book of Daniel* (1911), A. Bertholet, "Das Danielbuch" in *Die Religion in Geschichte und Gegenwart* (1909).

BELT See GIRDLE

BELT (AS *belt*, allied with OHG *bale*, Lat *balteus*, girdle, belt) In engineering machinery

and the mill, a flexible cord or band passing about the periphery of wheels or drums for the purpose of transmitting motion or power from one to another. Commonly the name 'belt' is given only to broad, flat bands of leather, rubber, or woven fabric, ropes, chains, etc., although serving similar purposes, being classed separately as rope drive, chain drive, etc. (See POWER, TRANSMISSION OF.) The best leather belts are made from the back strips of all oak-tanned leather, curried with the use of cod oil and tallow. To form the lengths of leather into the long endless belt, they are connected end to end by lacing, riveting, or cementing and lacing. The strength of leather belts in the body of the belt is from 2000 to 5000 pounds per square inch, at the joints only about from 1000 pounds to 1500 pounds, for lacing, and from 1000 pounds to 2500 pounds for riveted joints, the safe working strain is taken generally at not over one-third the strength at the joint. Leather belts should be protected from steam, vapor, water, oil drippings, and moisture, and should not be submitted to a heat of over 110° F. They are usually run with the grain side next to the pulleys since this side is smoother and gives better surface adhesion, it stands the wear better, and the flesh side is stronger and the part least subjected to wear. This arrangement gives the belt longer life and greater propelling power. Leather-chain or leather-link belting consists of short sections of leather joined by metal rivets. Rubber belts are made of two or more layers of canvas connected together with a rubber composition and then heated until the rubber vulcanizes. The advantages claimed for rubber belting are its practically unlimited length without jointing, its perfect uniformity in width and thickness, ability to endure greater degrees of heat or cold safely, less danger of injury from moisture and steam vapor, great durability and strength, and greater adhesion to the pulleys than is afforded by leather belting. Grease, or any other solvent of rubber, rapidly deteriorates and destroys rubber belts. Besides leather and rubber belting, cotton, hair, and most of the more common textile fibres are used for manufacturing them.

Transmission of power by belts is more common in the United States than in European countries, but of late years there has been an increase in the use of belts outside of the United States. There is a variety of woven fabric belts employed. The great favor with which power transmission by belting is received is due to the fact that the belt is relatively silent and elastic and will slip without injury to the machinery if unduly strained. Ordinarily, flexible belts transmit power by the adhesion due to their tension or pressure on the contact surface, which develops friction between them and their pulleys if they start to slip. The pulley which communicates motion is the driving pulley, that which receives, the driven pulley, that part of the belt which runs from the driven pulley to the driver is the driving part of the belt, since it is pulled by the driver, and in turn pulls on the driven pulley, the part of the belt which runs from the driver to the driven pulley is the tight or slack belt. If the pulley is higher at one side than at the other, the belt will creep towards the lowest part, for this reason the surface of the pulley is usually not made cylindrical, but of greater diameter at the centre. If this be overdone, the belt does not pull with

its whole cross-sectional strength, but mainly along its central part. The pulleys usually lie in the same plane and with their axes parallel, but this is not necessary, provided that the course of each part of the belt—the driving and the slack part alike—be in the plane of the pulley towards which that part of the belt runs, the belt being always delivered by one pulley into the plane of the other.

Chains of flat metal links which hook or are riveted into one another are now extensively used and are often loosely called belts, under the commercial designation of link belts or drive chains. The links are all alike, and no tools are required to assemble certain designs. They run on sprockets or on the toothed surfaces of gears, and furnish a positive drive. Belts are made in a great variety of sizes, some of them being very large. As extreme cases, may be noted: A leather belt of the New Jersey Zinc Works, 4 thicknesses, 48 inches wide and 102 feet long, a rubber belt in Chicago, 6-ply, 48 inches wide and 320 feet long, a leather belt for a paper mill in Wilmington, Del., 60 inches wide and 186½ feet long. For a summary of modern practice in belts and belting consult Kent, *Mechanical Engineer's Pocket-Book* (New York, 1914).

BELT, GREAT and **LITTLE**. Names given to the two straits of eastern Denmark which, with the Sound, connect the waters of the Kattegat with the Baltic (Map Denmark, C and D 3). The Great Belt, which includes the Store Belt and the Langeland Belt, is about 70 miles long and varies from 8 to 20 miles in width, in fact broadening to 30 miles towards the south in Vordunborg Bay, it separates Seeland and Langeland on the east from Funen and Langeland on the west. The Little or Lille Belt, which is shallow, is about 50 miles long and varies from less than a mile in width at the north to an extreme width of 30 miles, its average width being less than 10 miles, it separates Funen on the east from Jutland and Schleswig on the west. Both straits are difficult to navigate on account of currents and sand banks and ice adds another impediment in winter, the smaller route is little used.

BELTANE (Scottish Gael. *Bealltanne*), **BELLTAINE**, or **BELTINE**. A pagan Celtic festival, traces of which have survived to this day. The name is still used for May Day in Gaelic Scotland. The etymology and original meaning are uncertain. "*Cormac's Glossary*," an Irish text of the tenth century, contains the earliest mention of the institution (spelled *belltaine* and *beltime*), and two different explanations are there given of its meaning. In one place it is said to mean "lucky fire," and in another "fire of Bel," who is declared to be "an idol god." The second of these interpretations has been commonly accepted, but without any sufficient evidence. The identification of *bel* as the name of a god is doubtful, and even the connection between the second element and Irish *teine*, 'fire,' is open to question. In any case, however, the Semitic Baal has nothing to do with the matter.

Cormac's description of Beltine is very brief. He simply says that the Druids used to make two fires with great incantations and drive their cattle between them as a safeguard against disease. This custom of driving domestic animals through fire is still known in Brittany and the islands of Arran, and in certain May-day festi-

ties it was practiced until recently in Scotland. A young man, selected by a prescribed ceremonial, was similarly compelled to leap three times through fire. Both these ceremonies look like symbolical sacrifices, and there may have been a time when the victims were actually burned. The whole set of observances, like the German *Johannisfeuer* at the summer solstice, is usually explained (and doubtless correctly) as a branch of sun worship.

Consult, for the statement in Cormac, *Glossary*, the edition by O'Donovan and Stokes (London, 1862), for the Scottish Beltane, Jamieson, *Scottish Dictionary* (Edinburgh, 1808), for the significance of the ceremonies, A. Bertrand, *La religion des Gaulois* (Paris, 1897), MacCulloch, *The Religion of the Ancient Celts* (Edinburgh, 1911). Rhys makes some comparisons with the Athenian Thargelia in his *Hübner Lectures* (London, 1887).

BELTON. A city, and the county seat of Bell Co., Tex., 56 miles (direct) north by east of Austin, on the Leon River, and on the Missouri, Kansas, and Texas and the Gulf, Colorado, and Santa Fe railroads (Map Texas, D 4). It has a county courthouse, a Carnegie library, and jail buildings, and is the seat of Baylor Female College (Baptist), opened in 1845. Building stone, quarried in the vicinity, and cotton constitute an extensive export trade, and among the industrial establishments are cotton, cotton-seed oil, and flour mills, foundries, lumber yards, marble works, and an ice factory. The water works and sewage system are owned by the city. Pop., 1890, 3000, 1900, 3700, 1910, 4167.

BELTRAFFIO, bĕl-traf'yo, or **BOLTRAF-FIO**, GIOVANNI ANTONIO (1467-1516). A Milanese painter of the High Renaissance. He was born of noble parentage, studied painting with Leonardo da Vinci, whose favorite pupil he was, and practiced his art as an amateur. His earliest works are quite in the manner of Leonardo and often after his designs, such as "Madonna Handing the Christ Child a Flower" in the Salting Collection, London, and the Creppi Collection, Milan, "St Sebastian" in the Frizzoni Collection, Bergamo, and "Narcissus" in the Uffizi, Florence. He gradually evolved an independent style, harder in line and smoother in finish, but more important in content. His paintings, usually of small form, are most numerous in the galleries of Milan and Bergamo. Among the best examples are the "Madonna with the Vase of Flowers" in the Poldo-Pezzoli Collection, Milan, esteemed by Morelli his finest work, and two others in the National galleries of London and Budapest, the "Madonna Casio" in the Louvre, and the "Resurrection of Christ" (wrongly attributed to Leonardo) in the Berlin Gallery. In portraiture Beltraffio is one of the very finest of Leonardo's school. The best examples of his work of this type are the Giovanni Casio in the Brera and Frizzoni collections, Milan, "A Scholar," in the Isola Bella, probably, also, the celebrated "La Belle Ferronnière," usually attributed to Leonardo, in the Louvre, and the "Lady with the Weasel," at Cracow. Among his excellent drawings the best known are two pastels of a young man and woman in the Ambrosiana, Milan.

BELTRAME, bĕl-tra'mă, GIOVANNI (1824-1906). An Italian philologist and missionary, born at Valeggio, in north Italy, and educated

at the American monastery of San Lazzaro Venice. In 1854 he was sent to Khartum and Fazogl by an Austrian missionary society, and in 1858 he accompanied Knoblicher to the newly established missionary station, "Holy Cross" on the White Nile. He returned to Europe in 1862 and became professor at Verona. In 1878 he was elected to the Venetian Institute. The following are his principal publications: *Grammatica della lingua Denka* (1880), *Vocabolario Italiano-Denka e Denka Italiano* (1880), *Il Sennar e lo Scwangallah* (2 vols., 1880), *Il fiume bianco e Denko* (1881), *In Palestina* (1895).

BELTRAMI, bĕl-tra'mĕ, EUGENIO (1835-1900). An Italian mathematician. He was born at Cremona and taught mathematical physics at the University of Rome and at several other Italian universities. The Lincei, a celebrated academy of Rome, honored Beltrami by electing him president. His contributions to mathematics are largely on the subject of non-Euclidian geometry. (See GEOMETRY.) He reached the remarkable conclusion that the propositions of non-Euclidian geometry relate to figures lying upon surfaces of constant curvature. The conclusion that there are three geometries—the hyperbolic on a surface of constant negative curvature, the elliptic on a surface of constant positive curvature, and the Euclidian on a surface of zero curvature—rests upon the researches of Beltrami, Helmholtz, and Riemann. Thus Beltrami has taken a conspicuous part in laying the foundation of modern geometry. The most important among his numerous essays is the monograph, "Saggio di interpretazione della geometria non-euclidea," published in the *Giornale di Matematica VI* (Rome). The following theorem is known as Beltrami's: "The centre of a circle circumscribing a triangle is the centre of gravity of the centres of its inscribed and escribed circles." Besides his work in pure mathematics, his contributions to mathematical physics deserve mention, his original publications in the latter field including papers on electricity and magnetism, elasticity, etc.

BELTRAMI, GIOVANNI (1779-1854). An Italian lapidary, born at Cremona. With the exception of a preliminary course with Giacomo Guerrini, he was self-taught. His fine work secured for him a patron in Eugène Beauharnais, for whom he executed 16 cameos, representing episodes from the story of Psyche. At the request of the Empress of Austria he prepared, in 1815, a cameo portrait of her father, the King of Bavaria, and 10 years afterward a similar portrait of her husband, Francis I. Such was his skill that on one occasion he reproduced "The Lord's Supper," by Leonardo da Vinci, upon a single topaz.

BELUCHISTAN, bĕl'uch'chĕ-stăn'. See BALUCHISTAN.

BELUGA. See WHITE WHALE.

BELUGA, or **BIELAGA** (Russ. *byeluga*, from *byely*, white) A Russian sturgeon. See STURGEON.

BELUS (Lat., Gk. *Bēlos*, *Bēlos*). 1 The name of the Babylonian god Bel (q.v.) was given by Greek writers as Belos, and in Latin as Belus. Herodotus identifies Belos with Zeus (1, 181). 2 Passing into Greek mythology, the god of Babylon became a hero and found his place in various genealogical schemes. He appears as the son of Poseidon and father of Danaos and Ægyptus, as the son of Alcæus,

son of Hercules, father of Ninus, the first King of Assyria, and grandfather of Agron, the first King of Sardinia, as father of Cepheus, whose daughter Andromeda bore to Perseus Perseus, the eponymous hero of the Persians, and as father of Dido, the founder of Carthage.

BELUS The name of a river in Syria famous for the fish found there in abundance from whose shells the ancient Phoenicians obtained the Tyrian purple, and for the fine sand from which glass was made. The modern name of the river is Nahr Na'mem. It empties into the Mediterranean near Acre.

BELVEDERE, bĕl'vĕ-dĕr, *It pron* bĕl'vā-dā'rā (It *bel*, beautiful + *vedere*, to see, a view). An Italian term, applied originally to an erection like a loggia on the top of a house, or a detached summerhouse or terrace set upon an eminence, for the purpose of commanding a view. It is also sometimes used of a large inclosed—usually glassed-in—structure, for example, that part of the Vatican Palace (qv) in Rome known as the Belvedere, which is now part of the sculpture gallery. The name is also given to an arcaded summerhouse of the royal palace at Prague, to a loggia or open hall in the Imperial gardens of Schonbrunn, near Vienna, and to the entire palace of Prince Eugene in Vienna.

BELVEDERE, bĕl'vā-dā'rā, *CORTILE DEL*. A court in the Vatican, about which are placed some of the most famous works of ancient sculpture—the Torso of Hercules, the Laocoon, the Apollo Belvedere, and the Sarcophagus of Lucius Cornelius Scipio Barbatus.

BELVIDERE, bĕl'vĭ-dĕr' A city and the county seat of Boone Co., Ill., 76 miles (direct) north-west of Chicago, on the Kishwaukee River, and on the Chicago and Northwestern Railroad (Map Illinois, D 1). It contains a public library, city park, a fine opera house, and a courthouse and county-record building. The city is noted as a manufacturing centre, producing extensively sewing machines, corsets, safety razors, bicycles, automobiles, boilers, condensed milk, butter, screen doors, and flour. It is surrounded by a fertile agricultural district and has important dairying and sheep-raising interests. Settled in 1836, Belvidere was incorporated first in 1857. The government is administered under a charter of 1881, which provides for a mayor, elected every two years, and a city council. The water works are owned and operated by the municipality. Pop., 1900, 6937, 1910, 7253.

BELVIDERE A town and the county seat of Warren Co., N. J., 62 miles by rail north-west of Trenton, on the Delaware River, and on the Pennsylvania and Lehigh and Hudson River railroads (Map New Jersey, B 2). It derives good water power from Pequog Creek, which here empties into the Delaware, and has a large silk mill, a felt factory, flour mills, and furniture and hosiery factories. Pop., 1890, 1768, 1900, 1784, 1905, 1869, 1910, 1764.

BELZONI, bĕl'tsō'nĕ, GIAMBATTISTA (1778-1823). An Italian explorer and archaeologist. He was born in Padua and was educated in Rome for the priesthood, but, having a natural inclination for mechanics, and especially hydraulics, he abandoned his theological studies and returned to Padua when Rome was occupied by the French troops. He went to Holland in 1800 and to England in 1803. There he lived for nine years in great poverty, being often

compelled to earn a living by giving athletic performances at the theatre. Later, he traveled to Spain, Portugal, and Malta, and in 1815 went to Egypt in order to construct a hydraulic engine for Mohammed Ali, to raise the waters of the Nile. In Egypt he met Burckhardt and Salt, through whose advice and encouragement he began the exploration of Egyptian antiquities. In 1817 he cleared away the sand from the entrance to the great rock-hewn temple of Abu Simbul (qv), and in the same year discovered the finest of the royal tombs (that of Seti I) at Thebes. It is still known as "Belzoni's tomb." At Gizeh he found the entrance to Khafra's Pyramid (1818) and made the first thorough examination of the great pyramids. He also explored the desert between the Red Sea and the Nile and visited the oasis of Siwa. The discovery of the ancient emerald mines at Gebel Zabara is often ascribed to him, but erroneously, as the place had previously been visited by Bruce and Caillaud. Belzoni engraved his name upon many ancient monuments in commemoration of his discoveries.

In 1819 he returned to Italy and thence to England, bringing with him, for exhibition and for sale, a valuable collection of antiquities, among them the splendid alabaster sarcophagus of Seti I (now in the Kensington Museum), and the upper half of a colossal statue of Rameses II (now in the British Museum), found at the Ramesseum. Two years later he published his *Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, and Excavations in Egypt and Nubia, and of a Journey to the Coast of the Red Sea in Search of the Ancient Berenice, and Another to the Oasis of Jupiter Ammon* (London, 1821). In 1823 Belzoni undertook a journey to Timbuktu, in Central Africa, but was attacked by dysentery at Benin, and died at Gato, Dec. 3, 1823. Belzoni's skill as a draftsman was of great service to him in his archaeological investigations. His fine drawings of the royal tombs at Thebes were published in 1829 by his widow.

BEM, JOZEF (1795-1850) A Polish revolutionist and Hungarian patriot. He was born at Tarnow, in Galicia, fought under Napoleon in the campaign of 1812, and entered the Polish army, serving till 1825. He distinguished himself in the Polish revolution of 1830-31, rising to the position of commander in chief of the artillery. On the collapse of the revolution he took refuge in France. He took a prominent part in the insurrection of October, 1843, in Vienna. He succeeded in escaping and joined the Hungarians. He was intrusted with the command of the Army of Transylvania, amounting to 8000 or 10,000 men. Checked at first, he defeated the Austrians at the Bridge of Piski, and finally succeeded, in March, 1849, in driving both them and their Russian allies into Wallachia. After expelling the troops under Puchner from the Banat, Bem, with his army increased to 40,000 men, returned into Transylvania, where the Russians had defeated the Hungarians. Here he endeavored unsuccessfully to prevent the union of the Russians with the Austrians. On July 31 he was defeated by vastly superior forces at Schassburg. At Kossuth's request he now hastened into Hungary, where he took part in the battle near Temesvár. Retreating into Transylvania, he there defended himself for some days against

overwhelming numbers and then made his escape into Turkey. There he embraced Islam, took the name of Amurath Pasha, and received a command in the army. He was wounded while suppressing an anti-Christian riot at Aleppo. He died there of the fever. Bem was a man of unselfish character, of great zeal and devotion, and possessed fine military talents. He wrote a work on mnemonics, the *Exposé général de la méthode mnémonique polonaise*, etc. Consult N. N. Lajos, *Le général Bem* (Paris, 1851) and Czetz, *Bems Feldzug in Siebenburgen* (Hamburg, 1850).

BEMA (Gk βῆμα, *bēma*, a step, raised place). The sanctuary of a church, so called by the Greek church because the sanctuary end was raised above the rest of the pavement. It begins at the outer edge of the choir and is separated from the body of the church by the *iconostasis*, or *icteos*, or choir screen. See CHANCEL, CHOIR, CHURCH.

BEMAN, WOOSTER WOODRUFF (1850-) An American mathematician, born in Southington, Conn. He graduated from the University of Michigan in 1870, becoming in the same year instructor in Greek and mathematics at Kalamazoo College. By the University of Michigan he was appointed instructor (1871), assistant professor (1874), associate professor (1882), and professor (1887) in the department of mathematics. With David Eugene Smith he wrote *Plane and Solid Geometry* (1895), *Higher Arithmetic* (1897), *Famous Problems in Elementary Geometry* (1897), *New Plane and Solid Geometry* (1899), *Elements of Algebra* (1900), *A Brief History of Mathematics* (1900), *Academic Algebra* (1902). From the German of Dedekind he prepared *The Nature and Meaning of Numbers* (1901).

BENBA. See BANGWEOLO.

BENBERG, BAN'BAR', HENRI (1861-) A French composer and conductor, born in Paris. He studied at the Conservatory of that city, among his teachers being Dubois, Franck, and Massenet. He is widely known by many successful songs and piano compositions, but in France is chiefly recognized as a dramatic composer. His principal works are *Le baiser de Suzon*, a one act opera, which met with but moderate success when first presented at the Opéra Comique, Paris, in 1888, and the more ambitious and successful four-act *opéra-légende*, *Elaine*, which was first heard at Covent Garden Theatre, London, in 1892 and afterward in New York (1894).

BEMBICIDÆ, bēm-bis'ī-dē (Neo-Lat., from Gk βέμβη, *bembē*, a spinning top, a buzzing insect, probably from the loud, whirling sound which accompanies their flight). A family of fossorial Hymenoptera, which, with the Sphecidae, are popularly known as sand wasps (q.v.).

BEMBO, PRINCE (1470-1547). One of the most celebrated and influential writers of his century. Born of a powerful Venetian family, his life was passed in the most elegant and learned circles of Florence (1479), Ferrara (1498), Urbino (1506-12), Venice (1500-06, 1520-30) and Rome (1513-20, 1539-47). At Rome he was first secretary to the Pope and later a Cardinal, at Venice he acted as historiographer of the Republic and curator of St Mark's Library. Bembo's influence was deeply felt in the literature of Italy during the following three centuries. In his own time he played much the

rôle that Petrarch had filled before him. His *Prose della volgar lingua* (1525), supported by the rigorous example of his own correspondence and published works, brought about the triumph of the classic tradition in the Italian language, which came to be modeled rigidly on the language of Dante, Petrarch, and Boccaccio. In poetry he aroused a tremendous interest in Petrarch, and in application of the pseudo-Aristotelian doctrine of imitation he fastened the direct imitation of Petrarch upon Italian poetry for a long time to come. The resulting style, which avoids the vagaries of the earlier Petrarchism, has been known as *bembism*. Its dignified sterility is exemplified in Bembo's own *Rime*. His dialogues entitled *Gl'Asolani* are an interesting exposition of that idealism in the concept of love which exerted much influence on the sophisticated social life of Italy. Bembo was equally renowned in his own age as a humanist, editor, and historian. Consult Symonds, *Renaissance in Italy* (London, 1881), Spingarn, *History of Criticism in the Renaissance* (2d ed., New York, 1906), J. B. Fletcher, *The Religion of Beauty in Woman* (New York, 1911), Trialetta, *Storia della grammatica italiana* (Padova, 1908).

BEMIDJI, bē-mid'jī. A city, and the county seat of Beltrami Co., Minn., 180 miles west by north of Duluth, on the Great Northern, the Minneapolis, Red Lake, and Manitoba, the Minneapolis, St. Paul, and Sault Ste. Marie, and the Minnesota and International railroads (Map Minnesota, C 3). Situated on a lake, Bemidji is a popular summer resort, and has a State normal school, a fine Federal building, and a public library. It is the centre of a considerable lumbering industry, and manufactures crates and axe handles. Bemidji was settled in 1892 and was incorporated as a city in 1905. The city owns its water works. Pop., 1900, 1213. 1910, 5009.

BEMIS, EDWARD WEBSTER (1860-) An American political economist. He was born in Springfield, Mass., and graduated at Amherst College in 1880. He was professor of history and political economy at Vanderbilt University (1889-92), assistant professor of political economy at the University of Chicago (1892-95), assistant statistician of the Bureau of Labor Statistics for the State of Illinois (1896), and professor of political science at the State Agricultural College, Kansas (1897-99). He was involved in a controversy with President Harper when he left the University of Chicago. Professor Bemis charged that he was persecuted because of his radical attacks on corporations in his extension lectures. He was director of the department of municipal monopolies in the Bureau of Economic Research, New York, in 1899-1901, when he became superintendent of water works at Cleveland, Ohio. His publications include *History of Cooperation in the United States* (1888), *Municipal Monopolies* (1899), *Municipal Ownership of Gas-Works in the United States* (1891), and magazine articles on similar subjects. In 1913 was published his *Report on the Investigation of the Chicago Telephone Company*.

BEMIS HEIGHTS. See SARATOGA, BATTLES OF.

BEMONT, bē-mōn', CHARLES (1848-) A French scholar, born Nov. 16, 1848, in Paris. His writings comprise the results of his researches into English and European history, and

his most important works are *Les chartes des libertés anglaises* (1892), and, with G. Monod, *Medieval Europe from 395 to 1270* (New York, 1906). In 1896 he produced a supplement to the first volume of the *Gascon Rolls* which Francisque Michel had begun, and in 1900 issued the second volume, covering the years 1273-90. This was followed in 1906 by the third volume for the years 1290-1307. In 1909 the University of Oxford conferred upon him the honorary degree of Litt D.

BEN. The Hebrew word for "son." It is sometimes used as a part of a name, e.g., Benhadad, translation of Bar Hadad, son of Hadad, the chief deity of the Arameans, Benjamin, son of the right hand, etc. 1 The plural, *Bene*, is used to indicate a combination of families into a clan or tribe, or of clans into a confederation—Bene Ammon, Bene Israel. 2 In Arabic one finds the corresponding word *Ibn* similarly used, which sometimes appears modified in European languages as Ebn, Aben, or Aven. Its plural, *Banu* or *Beni*, is found in the names of many Arab tribes—as Banu Umayya, the sons of Umayya, the family known in history as the Umayyads, and sometimes in the name of places—as Beni-Hassan.

BEN, BEINN, or BHEIN. A Gaelic word signifying "mountain" or "mountain head." It is prefixed to the name of a great many mountains in Scotland—as Ben Nevis, Ben Macdui, Ben Cruachan, etc. The corresponding term in various parts of Europe is *Pen*, which is found in the names in Cornwall and Wales, in the Pennine Alps, and also in the word "Apennines," and probably in the Cevennes of France.

BEN, OIL OF (Ar *bān*, name of the tree). A fixed oil used in perfumery in extracting the fragrant principles of various plants. It is itself odorless and does not readily decompose. It is obtained by expressing the seeds (called *ben* or *ben nuts*) of several species of *Moringa*, a genus of trees growing in northern Africa, Arabia, and the East Indies. The ben oil of commerce is derived mainly from the *Moringa aptera*.

BENACUS, LACUS (Lat *Benacus Lake*). The Roman name of the Lake of Garda (*Lago di Garda*), a long stretch of water in Venetian territory, which in 1859 formed part of the boundary line between Austria and Italy.

BENADIR, ben'a-der' An administrative division of Italian Somaliland, on the east coast of Africa, extending from the mouth of the river Juba to lat 20° 30' N. Originally the territory now included in the Benadir coast was leased from the Sultan of Zanzibar in 1892 and was purchased outright for about \$700,000 in 1905, the administration being taken over by the government from the Benadir Company. There is a police corps and troops to the number of about 3500. Cattle raising and the growing of cotton are the leading occupations. The principal towns are Brava, Merka, Mereg, Warsheik, and Mogadisho, the last mentioned with a population of about 10,000 and the seat of the civil government of the colony.

BENALCÁZAR, bā'nāl-ka'thar, SEBASTIAN DE, properly SEBASTIAN MOYANO (c.1499-1550). A Spanish conqueror, born in Benalcázar, Estremadura. He accompanied Pedrarias to Darien in 1514, came to stand high in the confidence of Francisco Pizarro, and in 1533 defeated the Peruvian army of the plains of Riobamba.

and took the city of Quito. Subsequently he proceeded to the invasion of Popayan, a region comprising the southwestern portion of the present Colombia. He was appointed Governor of Popayan Province in 1538.

BÉNARD, bā'nar', HENRI JEAN EMILE (1844-) A French architect, born at Goderville. He studied at the Ecole des Beaux-Arts in Paris and was awarded the Prix de Rome in 1867. For some time he practiced in Havre and Paris in the employ of the government. In the international competition for plans for the University of California in 1899 he won the first prize against a hundred competitors. His plans, which call for the expenditure of \$10,000,000, are being followed with somewhat material changes of detail.

BENARES, bēn-ā'ez A division in the Northwest Provinces of British India. Area, 10,423 square miles, pop., 1891, 5,368,600, 1901, 5,032,500, 1911, 4,809,478.

BENARES (Skr *Vārāṇasī*, of unknown etymology, its ancient Skr name was *Kāśī*). The holy city of the Hindus, capital of the Benares division, Agra, United Provinces of Agra and Oudh, British India, situated on the left bank of the Ganges, by rail 479 miles from Calcutta and 941 from Bombay. The Ganges here varies, according to the season, between 50 and 90 feet in depth, and in width between 600 yards and a little more than half a mile (Map India, D 3). Since 1887 the river has been spanned at Benares by the Dufferin Railway Bridge, 3518 feet long. The city is in lat 25° 18' N and long 83° 1' E. The native city extends for 4 miles along the in-curving river and from 1 to 2 miles back. The river bank, which is comparatively steep, is chiefly occupied by 47 flights of steps, or ghats, where crowds of all classes spend the day in business, amusement, or devotion. Backed by hundreds of temples, the white minarets of Aurangzeb's mosque rising above the rest, this scene presents a picturesque appearance. On closer inspection, however, the city, as a whole, is disappointing. The streets, or rather alleys, impracticable for carriages, barely afford a passage to individual horsemen or single beasts of burden, and these thoroughfares, besides being shut out from sun and air by buildings of several stories, are shared with the sacred bulls that roam about at will. As the central seat of Hinduism, Benares attracts immense crowds of pilgrims. West of the native city lies the suburb of Sigra, the seat of the principal missionary institutions, and to the north is the Sikraul cantonment, with the official establishment and European residences.

In the traditions of the country Benares is believed to have been coeval with creation, and tolerably authentic history assigns to it a high antiquity. In its actual condition Benares is a modern city. In extent and in embellishment it owes much to the influence of Mahratta ascendancy, and it possesses, perhaps, not a single structure that reaches back to the close of the sixteenth century.

The Benares College was opened in 1791. It is maintained by the government and includes the Sanskrit college, with over 400 students, and the English college, with about 100. It occupies a fine building, completed in 1852, and is attended by Hindus and a few Mussulmans and native Christians. Benares is industrious and wealthy as well as sacred. Besides

manufactures in cotton, wool, silk, and ornamental brass work, its commanding position on the grand line of communication—road, river, and rail alike—renders it the principal emporium of the neighboring regions. It is the great mart for the shawls of the north, the diamonds of the south, and the muslins of the east, while it circulates the varied products of Europe and America over Bundelkhand, Gorakhpur, Nepal, etc. The municipal institutions include fourteen hospitals, dispensaries, asylums for lunatics, lepers, and the blind, jail, swimming bath, fine public gardens, water works, and a sewerage system. Pop., 1891, 219,500, 1901, 213,079, 1911, 203,804. After Lucknow it is the largest city in the United Provinces. Benares was ceded to the East India Company in 1775. The fanatical character of the inhabitants was a cause of anxiety in the mutiny of 1857, but a rising was promptly suppressed, and the population was kept in check by the frequent passage of troops from Calcutta to the north. Consult Shearing, *The Sacred City of the Hindus* (London, 1868), and Ralph, "The Sacred City of the Hindus," in *Harper's Magazine*, vol. c (New York, 1900), Havell, *Benares, the Sacred City* (London, 1911), Rajani Rajan Sen, *The Holy City* (London, 1912).

BENARES A division, a district of the division, and a city in the district, in Agra, United Provinces of Agra and Oudh, British India. Outside of the city the district is devoted to agriculture and stock raising. The chief crops are rice, barley, wheat, maize, gram, and other varieties of grain. About 50 per cent of territory is irrigated by wells and canals. The area of the division is 10,431 square miles, pop., 1901, 5,068,618, 1911, 4,809,478 (about 90 per cent Hindu). District, 1008 square miles, pop., 892,084 and 897,035. See **BENARES (city)**.

BEN BOLT A song by Thomas Dunn English (1843), first published in the *New York Weekly Mirror* and widely reprinted. It owed its popularity largely to the old German air to which it was set. The song was revived in recent years through figuring in the extraordinarily successful *Trilby* of Du Maurier.

BENBOW, JOHN (1653-1702) A famous English admiral. He was born at Shrewsbury, entered the navy in 1678 and first distinguished himself as captain of a merchantman in a bloody action with Sallee pirates in 1686. He attracted the notice of James II, but he does not seem to have reentered the royal navy until June, 1689. His progress was rapid, and in the course of a few years he was made rear admiral by William III. The most memorable of his gallant sailor's exploits was his last, where his stubborn valor contrasted nobly with the dastardly behavior of his captains. Off Santa Marta, in the West Indies, on Aug. 19, 1702, he came up with a superior French force under Admiral Du Casse. For four days he kept up a running fight with the enemy, almost deserted by the rest of his squadron. On the morning of the 24th his right leg was smashed by a chain shot. His officers consoled with him "I had rather have lost them both," said the sturdy admiral, "than have seen this dishonor brought upon the English nation. But, hark ye—if another shot should take me off, behave like men, and fight it out!" As soon as his wound was dressed, he was carried to the quarter-deck and directed the fight while it lasted. The

enemy sustained severe loss, but the infamous cowardice of the other captains, who refused to obey the admiral's signals, made the contest hopeless, and Benbow sailed away to Jamaica. He died of his wound on November 4. The recusant officers were tried by court-martial and two captains were shot. Benbow's employment of explosive vessels at St. Malo seems to have been an anticipation of Lord Dundonald's method at Basque Roads. Consult Clowes, *Royal Navy*, vol. II (London, 1897), Fletcher, "Admiral Benbow," in *Macmillan's Magazine*, vol. LXXXIV (London, 1901).

BENCH As a legal term, originally the seat occupied by judges when holding court, later, the court or tribunal itself, and, then the judges as a class, in contradistinction to the bar. The Court of Common Bench is another name for the Court of Common Pleas. The *King's Bench* (called the Queen's Bench during the reign of a queen) was formerly the highest court of common law in Britain. During the Commonwealth it was known as the *Upper Bench*. It is now, by virtue of the Judicature Act of 1875, included in the High Court of Justice. See **BANC**, **COURTS**, **CURIA REGIS**, **KING'S BENCH**.

BENCH, BENCH MARK A mark made on some permanent body and used in tidal observations and leveling surveys. The bench is an assumed datum level to which the reading of the tide gauge or height of level plane is referred. A *bench mark* is a reference mark made upon some durable material, as the stone foundation of a building or a pier, its height above the zero of the tide gauge or other datum plane is determined and made a matter of record, so that by its means any desired level which has been once determined may be reestablished. In tidal observations a bench mark should be made and its height above the zero of the gauge ascertained as soon as the latter is put up, should the gauge then be injured or destroyed before the completion of the observations it may, by means of the bench mark, be set up again with its zero at the same level as before, and, if renewed observations are desired after a lapse of time, the bench mark enables them to be referred to the original plane of reference. In the ordinary leveling of the engineer or surveyor bench marks are extensively employed and all levels measured are referred to them. See **LEVELING**.

BENCH'ERS The name given to the governing bodies of the four great law societies of England—Inns of Court, Lincoln's Inn, Inner Temple, and Middle Temple. They are generally King's counsel or barristers of distinction. They have the entire management of the property of their respective inns and the power of admitting to the bar as well as of punishing a barrister guilty of misconduct, by disbarment or otherwise. Their presiding officer is called the *treasurer*. He is elected annually and takes the chair at their corporate meetings, speaking and acting in their name. See **BAR**, **INNS OF COURT**.

BENCH WARRANT. In England, a warrant issued by a court of record for the arrest of a person who has been indicted, or against whom articles of the peace have been exhibited. If it proceeds from a court of assize, it is signed by one judge; if from quarter sessions, by two justices of the peace. It is rarely used now. In the United States its use, its form, and the

officer by whom it may be issued are generally regulated by statute. In some States it may be issued by the clerk of the court or by the district attorney. It is also employed in some jurisdictions for the arrest of one guilty of contempt of court. See ARREST WARRANT.

BENCOOLEN See BENKULEN.

BENCZUR, ben'tsūr, GYULA (1844-) An Hungarian painter. He was born at Nyiregháza and studied with Hiltensperger, Anschütz, and Piloty. In 1880 he became professor at the Academy of Munich and afterward director of the Academy of Painting in Budapest. His distinction was recognized by his nomination as a member of the Hungarian House of Magnates. Benczur is, perhaps, the most faithful disciple of Piloty. His paintings show originality of conception and splendid coloring. The following are among the most noteworthy examples of his art: "Farewell of Ladislas Hunyady" (1897, Museum of Budapest), "Arrest of Rákóczy in 1701" (1869, Rumanian Court), "Louis XV in the Boudoir of Dubarry" (1870), "Family of Louis XVI during the Assault on Versailles" (1872, D O Mills, New York), "Baptism of St Stephen" (1875, Museum of Budapest), "Bacchante" (1881), "The Reconquest of Buda by Charles of Lorraine" (1888, Museum of Budapest).

BEND (OF *bende*, *bande*, Fr *bande*, of Eng *band*). One of the honorable ordinaries, or more important charges in heraldry (q v).

BENDA, GEORG (1722-95). A German musician. He was born at Jungbunzlau, Bohemia, and studied with his father, Hans Georg Benda. He became kapellmeister to Duke Frederick III of Saxe-Gotha in 1748, and in 1764 went to Italy at the Duke's expense for the purpose of study. He returned to Gotha in 1766, and devoted himself to composition, writing, in all, about 10 operas, several operettas, and the stirring melodramas *Aradne auf Nawos*, *Medea*, *Almansor*, and *Nadine*. In 1776 he resigned his position and visited Hamburg, Vienna, and other cities, and finally settled at the little hamlet of Kostritz. The important place which he holds in the history of German opera is due to his introduction of the music drama with spoken text. In other words, he was the originator of the pure melodrama, in which the whole musical part is confined to the orchestra, while the dialogue is spoken. Consult F Bruckner, *Georg Benda und das deutsche Singspiel* (Rostock, 1904).

BENDAVID, ben-da'vit, LAZARUS (1762-1832). A German-Jewish philosopher and mathematician. He was born in Berlin, studied at Berlin and Göttingen, and for a number of years lectured very successfully in Vienna in exposition of the Kantian philosophy. Expelled thence by a general decree against foreigners, he continued to lecture and write in Berlin. His publications include *Versuch über das Vergnügen* (2 vols, 1794), *Vorlesungen über die Kritik der reinen Vernunft* (1795), *Vorlesungen über die Kritik der praktischen Vernunft* (1796), *Philosophie oder über den Ursprung unserer Erkenntnis* (1802), *Selbst biographie* (1804).

BENDEMAN, ben'de-mán, EDUARD JULIUS FRIEDRICH (1811-89). A German historical and portrait painter. He was born in Berlin, the son of a cultured Jewish banker, Dec 3, 1811, and went at 16 to Dusseldorf with his master, Schadow, who had been chosen direc-

tor of the Academy. Together they went to Italy in 1829, and Bendemann remained till 1831. On his return he began his first great picture, "The Jews Mourning in Exile," which was exhibited the following year at Berlin, and, as the work of a youth of 21, created a sensation. It is now in the Museum at Cologne. With it may be classed two other important pictures on kindred subjects, "Jeremiah amid the Ruins of Jerusalem" (1834), belonging to the German Emperor, and "The Departure for Exile" (1872), in the National Gallery, Berlin. After practicing at Dusseldorf and Berlin Bendemann went to Dresden in 1838, as professor of painting at the Academy, and was soon commissioned by the King of Saxony to decorate some of the principal rooms in the royal palace there. For the throne room he designed a frieze depicting the course of human life, in one continuous design, and in the ball-room and concert hall he glorified the life and civilization of the Greeks. This exacting work occupied the greater part of his time for the next 15 years. From 1859 to 1867 he was director of the Academy at Dusseldorf, where he resided until his death. Bendemann was one of the founders and principal representatives of the Dusseldorf school. His art is essentially romantic in character, lacking in real pictorial elements, without truth to nature, and only valuable as illustrations. Far better than his historical paintings are portraits, like those of his wife, the poet Remich (Dantzig Museum), the historian Droysen (National Gallery, Berlin), his master Schadow (Academy, Dusseldorf), and his charcoal heads of celebrated contemporaries. He illustrated, among other works, the *Nibelungenlied*.

BENDER, or BENDERY, ben-dya'ri (Ar, Turk, market, harbor). A district town in the government of Bessarabia, Russia, situated on the right bank of the Dniester, 53 miles from its mouth, and 36 miles from Kishinev, the capital of the government (Map Russia, E 5). It is poorly built, but contains a number of churches, synagogues, a mosque, and a gymnasium for women. The trade is in grain, timber, cattle, animal products, and wine. The fort, situated near the town, was abandoned in 1897. Pop, 1885, 44,700, 1897, 31,800, 1900, 33,800. A large portion of the population is Jewish, and the rest consists of Russians, Armenians, and Tatars. In 1770 the Russians captured the place and put the garrison and inhabitants, then amounting to about 30,000, to the sword. After changing hands repeatedly between the Turks and the Russians, Bender was finally ceded to the latter by the Peace of Bucharest, 1812. Charles XII of Sweden lived from 1709 to 1712 at Varmitza, a village near Bender.

BENDER, WILHELM (1845-1901). A German theologian and philosopher. He was born at Münzenberg, in Hesse, Jan 15, 1845. He studied at Göttingen and Giessen, became professor of theology at Bonn, 1876, and was transferred to the philosophical faculty, 1888. An address he gave at the Luther celebration of 1883 made a great sensation (*Reformation und Kirchenthum*, Bonn, 1884), because of its extreme rationalistic tone, and he renewed the sensation by his later publications, *Das Wesen der Religion und die Grundgesetze der Kirchenbildung* (1886, 4th ed, 1898), and *Der Kampf um die Seligseligkeit* (1888), in which he explains religious phenomena by purely naturalistic evolu-

lutionary philosophy In 1899 he published the first volume of *Mythologie und Metaphysik Grundlinien einer Geschichte der Weltanschauungen* (Stuttgart)

BENDER ABBAS, bën'dēr ab'bas (Ar, Pers, harbor of Abbas) A seaport of Persia on the Strait of Ormuz, opposite the islet of Ormuz (Map Persia, F 7) It is very poorly built, and its former commercial importance has diminished considerably The roadstead is exposed to south and southeast winds, but there is still some trade, the chief exports being opium, fruit, tobacco, wool, and carpets The annual imports amount to about \$2,250,000, and the exports to about \$900,000 The town is connected by lines of steamships with Abushehr, Muscat, Bombay, and Basia The population, estimated between 10,000 and 20,000, is made up of Persians, Armenians, Kurds, and Arabs The most flourishing period in the history of the town was during the seventeenth century, after the exclusion of the Portuguese by Shah Abbas in 1622 Owing to the disturbed state of the country, the trade was transferred to Abushehr and the northern ports

BENDERY See BENDER

BENDIGO, formerly **SANDHURST** The capital of Bendigo Co, Loddon district, Victoria, Australia, on Bendigo Creek, 101 miles north-northwest of Melbourne, and on the railway between Melbourne and Echuca (Map Victoria, D 4) The town is the centre of a mining district, many important deposits of gold being at considerable depth The surrounding region is fertile, and much grain and fruit is raised There are manufactures of wine, carriages, and pottery, and breweries, tanneries, foundries, and brick and tile yards It is well built, has fine government buildings and offices, a very fine townhall, churches, a mechanics' institute, a hospital, fine public parks, botanical gardens, and owns a good water supply Founded in 1861, it became a municipality in 1855, a borough in 1863, and a city in 1871 The district has been created a bishop's see in connection with the Roman Catholic denomination Pop, 1901, 31,020, including 290 Chinese, 1911, 39,417

BENDIRE, bën dē'rē, CHARLES EMIL (1836-97) An American ornithologist He was born in Darmstadt, Germany, April 27, 1836 He came to the United States in 1852, and two years later entered the army as a private He retired April 24, 1886, with the rank of captain In 1890 he was made brevet major for distinguished services rendered in 1877, while fighting the Indians at Cañon Creek, Mont He died in Jacksonville, Fla., Feb 4, 1897 During his many campaigns, and while stationed at various remote army posts in the West, Southwest, and Northwest, he was most active in improving roads, surveying and constructing telegraphic lines so as to better military service, made independent explorations, and availed himself of the excellent opportunity to study birds It is supposed that he began to collect the nests and eggs of birds about the year 1870 In all he published about 50 papers and books, the majority of which relate to birds, especially with reference to nidification His largest work, *Life Histories of North American Birds, with Special Reference to their Breeding Habits and Eggs* (Smithsonian Contributions, Washington, 1892 and 1896), was left incomplete at the time of his death His large collection of birds' eggs,

15,000 in all, he presented to the United States National Museum

BEN'DIS A female divinity of Thiaee, identified by the Greeks with Artemis and later with Hecate She was probably a moon goddess In Plato's time a festival in her honor, called Bendideia, was celebrated with processions and torch races at the Piræus

BENDS See CATSKON DISEASE

BENDZIN, ben'jén (Polish) The capital city of a district in the government of Piotrków, Russian Poland, on the banks of the Black Przemsza, 264 miles from Warsaw, and near the Warsaw-Vienna Railway (Map Russia, A 4) The industrial activity of the population of Bendzin is centred in the large government zinc works, and there is considerable manufacture of fireproof bricks In the neighborhood are the rich Ravier coal mines The interesting ruins of an ancient castle (built in the thirteenth century) are a feature of the town Pop, 1897, 21,200, more than one-half of which is Jewish By the "Pact of Bendzin," concluded here in 1859, Sigismund IV was recognized by Austria as King of Poland, and the Archduke Maximilian, brother of Rudolph II, renounced his claims to the throne

BENE, bën'ē See SESAMUM

BENECKE, bā'ne-ke, ERNST WILHELM (1838-) A German geologist He was born in Würzburg and studied at the universities of Halle, Würzburg, Berlin, and Heidelberg He was extraordinary professor at Heidelberg University from 1869 to 1872, when he became full professor at Strassburg His chief researches have been upon the invertebrate fossils of the Mesozoic rocks of Germany He has been a member of the commission for the geological investigation of Alsace-Lorraine Among his principal works are the following *Ueber Flus und Jura in den Sudalpin* (1866), *Geognostisch-paläontologische Beiträge* (2 vols, 1868-72), *Abriss der Geologie von Elsass-Lotharingen* (1879), *Geognostische Beschreibung der Umgegend von Heidelberg* (1880), *Geologische Führer durch den Elsass* (1900)

BENECKE, GEORG FRIEDRICH (1762-1844) A German philologist He was born at Münchroth, in the former principality of Oettingen, and studied at the University of Göttingen, where he became professor of philosophy in 1814 and chief librarian in 1829 He was the first academic lecturer on Old-German literature and ranks with Grimm and Lachmann as an authority on Middle High German His editions of mediæval poetry include Bomer's *Edelstein* (1816), Wirtz von Grafenberg's *Wingalors* (1819), Hartmann von Aue's *Iwein*, with Lachmann (1827)

BENEDEK, bā'ne-dék, LUDWIG VON (1801-81) An Austrian general, son of a physician of Odenburg, Hungary He received his military education at the Academy Wiener-Neustadt and entered the army as ensign in 1822 In 1846 he had reached the rank of colonel and distinguished himself in suppressing the insurrection in Galicia In 1847 he was sent to Italy, where he fought with bravery in the campaign of 1848, especially at Cusatoine The following year he took a conspicuous part in the capture of Mortara and in the battle of Novara (March 23), and in April was sent as major general to Hungary, where he also served with gallantry In the Italian campaign of 1859 Benedek commanded the Eighth Corps of the Austrians and

was the last to leave the field at Solferino. was Military Governor of Hungary in 1860 and soon afterward was given the command of the Austrian army in Venetia. He led the Austrians in the war with Prussia in 1866 until he was disastrously defeated at Sadowa. He was removed, placed on the retired list, and withdrew to Gratz, where he died in 1881. See SEVEN WEEKS' WAR.

BENEDEN, bā'ne-dēn, PIERRE JOSEPH VAN (1809-94). A Belgian zoologist, born in Mechlin. He was appointed director of the Museum of Natural History in Louvain in 1831, professor at the University of Ghent in 1835, and professor of zoology and paleontology at the Catholic University of Louvain in 1836. In 1842 he was made a member of the Belgian Academy of Sciences, of which institution he was elected president in 1881. His principal works are: *Zoologie médicale*, with Gervais (2 vols., 1859), *Ostéographie des céteacés vivants et fossiles*, with Gervais (1868-80), *La vie animale et ses mystères* (1863), *Les commensaux et les parasites dans le règne animal* (1875), *Die Schmarotzer des Tierreichs* (1876).

BENEDETTI, bā'ne-dēt'tē, VINCENT, COUNT (1817-1900). A French diplomatist of Greek origin, born in Corsica. He was French Consul at Cairo and Palermo, Secretary of Legation in Constantinople, held office in the French Department of Foreign Affairs, and was secretary during the negotiation of the Treaty of Paris in 1856. In 1860 he went to Turin to negotiate the cession of Nice and Savoy to France, and in 1864 he was Ambassador to Berlin. Benedetti was personally concerned in the affair of the protest of Napoleon III against the candidacy of the Prince of Hohenzollern for the throne of Spain, and forced himself upon King William in the public walk at Ems, July 13, 1870, in so offensive a manner that he was informed that the King had nothing further to communicate to him. It is a moot question how far he was really responsible for precipitating war with Prussia. Certainly Bismarck used Benedetti's blunder to the best advantage in carrying out his own plans, and six days after the incident at Ems France declared war. Benedetti accused Bismarck of having in 1866 originated a Franco-Prussian treaty for the partition of Belgium and Luxemburg, but Bismarck showed that France herself had originated the scheme. Benedetti sought to justify his diplomatic activity in *Ma mission en Prusse* (Paris, 1871), and also published *Essais diplomatiques* (Paris, 1895).

BENEDETTO DA MAJANO, bā'nā-dēt'tā da ma-ya'nō (1442-97). One of the principal Florentine sculptors and decorators of the early Renaissance, also a distinguished architect. He was born at Florence, the son of a stonecutter and carpenter, and labored at first as assistant to his older brother Giuliano da Majano (q.v.), a well-known architect and wood carver. Benedetto was chiefly active as a sculptor in marble, and he also excelled in terra cotta. His earliest known work is the large marble altar of St. Savinus in the cathedral of Faenza (1471-72). In 1475 he designed and carved the beautiful marble altar of St. Fina in her Collegiate Church in San Gimignano, at the same time a tabernacle and a shrine. His other masterpieces include the ciborium on the high altar of San Domenico, Siena, the tabernacle in the badia of Arezzo, and especially the pulpit of Santa

Croce, Florence, adorned with marble reliefs from the life of St. Francis—the finest example of marble pictorial relief in Italian sculpture. Another masterpiece in decoration is his marble door frame in the Palazzo Vecchio, Florence. About 1480 the two brothers, in conjunction with the third, founded a chapel near Prato, the beautiful sculptures of which were unfortunately dispersed, some surviving in the cathedral of Prato. His later works are in the cathedral of Lucca (1484-87), the church of Monte Oliveto (c.1489), Naples, in San Gimignano, and include the well-known tomb of Filippo Strozzi (1491) in Santa Maria Novella, Florence. He died May 27, 1497.

Of his Madonnas the most attractive is a seated terra-cotta statue in the Museum of Berlin—one of the very few examples of such sculpture in which the colors are perfectly preserved. His portrait busts unite tenebrous realism with fine characterization. The best known are those of Pietro Mellini (1474) and Filippo Strozzi, the more expressive clay model of the latter is in Berlin, the finished marble in the Louvre. Benedetto's masterpiece in architecture is the Palazzo Strozzi, Florence, one of the finest and strongest specimens of Florentine palace architecture. The cornice and the court were completed after his death by Cronaca. He was one of the ablest marble and terra-cotta sculptors of the later fifteenth century. In his best work the figures are charming and characteristic, his decoration is always tasteful and, though rich, is never overloaded, but clear and harmonious. From about 1480 his art declined. Consult, for reproductions and comments on his sculpture, Bode, *Denkmäler der Renaissance Skulptur Toskanas*, vol. vii (Munich, 1892-1905), for his architecture, Stegmann and Von Geymüller, *Architektur der Renaissance in Toscana*, vol. iv (Munich, 1885-1908).

BENEDICTITE, bēn'e-dī't-tē. A song of the "Three Children" in the fiery furnace, given in the Old Testament Apocrypha, an expansion of Ps. cxlviii, was sung in the Christian Church as early as the time of St. Chrysostom and is used in the Anglican morning prayer, when the Te Deum is not sung, from Septuagesima to Easter and also during Advent, and in the office of lauds in the Roman Breviary. The name originated in the opening sentence, *Benedicite omnia opera Dei* ('Praise ye all the works of God!').

BENEDICK. A cynical, witty lord of Padua, in Shakespeare's *Much Ado About Nothing*. He rails at marriage, but falls an easy prey to the plot to unite him and Beatrice. Hence the term "a Benedick" for a newly married man.

BENEDICT. The name of 14 Popes. BENEDICT I, Pope 574-578, during the Lombard devastation of Italy, grief at which is said to have killed him.—BENEDICT II, Pope 684-685, canonized for his virtues. He decided the English controversy in favor of Wilfrid of York (q.v.) and labored in vain to reclaim Macarius, the Patriarch of Antioch, who was living in exile in Rome, from his Monothelite belief.—BENEDICT III, Pope 855-858. His election was opposed by the Emperor Lothair, but he was finally acknowledged, and did much during his short reign for the building and adornment of churches in Rome.—BENEDICT IV, Pope 900-903, famous for his charity to the poor and other virtues only too rare in the unhappy tenth century.—BENEDICT V, Pope 964-965, elected

against the will of the Emperor Otho I, who took him off to Germany, where he died a prisoner in Hamburg —BENEDICT VI, Pope 972-974 He met with a similar fate, at the hands of the Consul Crescentius, son of the notorious Theodora —BENEDICT VII, Pope 974-983 He was a promoter of monasticism and ecclesiastical discipline and summoned a synod for the suppression of simony His later years, like those of Benedict I, were saddened by the devastation of Roman territory, this time by the Emperor Otho II —BENEDICT VIII, son of Count Gregory of Tusculum, was elected in 1012, but the Antipope Gregory, who had been elected at the same time, fled to the court of the Emperor Henry II to get his assistance, but Henry decided in favor of Benedict, who a little later crowned him in Rome (1014) Benedict afterward defeated the Saracens and took from them, with the help of the Pisans and Genoese, the island of Sardinia, and also various places in Apulia from the Greeks, by the help of Henry He distinguished himself as a reformer of the clergy and interdicted, at the synod of Pavia, both clerical marriage and concubinage He died in 1024 See his *Life* by P G Wappler (Leipzig, 1897) —BENEDICT IX, a nephew of the preceding, named Theophylact, was elected Pope while merely a youth, in 1033, but a little later the Romans banished him He was reinstated by Conrad II (1038), again formally deposed by the Consul Ptolemaeus, who set up Sylvester III in his place (1044), and after three months was once more installed as Pope By a new compact John Gratianus was declared Pope under the name of Gregory VI (1045) The Emperor Henry III deposed all the three Popes—Benedict, Sylvester, and Gregory—and caused Suigdis, Bishop of Bamberg, to be elected as Clement II (1046), but on his death, in 1047, the deposed Benedict IX again regained the papal see, and held it eight months, until 1048, when he was displaced, first by Damasus II and afterward by Leo IX According to one report he died in the Convent of Grotta Ferrata, near Rome, in 1056 See his *Life* by Giovagnoli (Milan, 1900) —BENEDICT X, a disputed Pope, 1058-59 —BENEDICT XI, Pope 1303-04 —BENEDICT XII, Pope 1334-42, one of the Avignon Popes —BENEDICT XIII (born Pietro Francesco degli Orsini), Pope 1724-30, was a learned and well-disposed man, of simple habits and pure morals, though rather strict in his notions on the papal prerogative He unfortunately yielded himself to the guidance of Cardinal Corcia, a greedy, unscrupulous personage, who greatly abused the confidence reposed in him Benedict always exhibited great moderation in politics and an honorable love of peace, and was instrumental in bringing about the Seville Treaty of 1729 During this pontificate a remarkably large number of saints, chiefly from the monastic orders, including Pope Gregory VII and John of Nepomuk, were added to the calendar The name Benedict XIII was also claimed by the Antipope Pedro de Luna (q v) from 1394 to 1409 —BENEDICT XIV (Prospero Lambertini), Pope 1740-58—the most worthy to be remembered of all the pontiffs so named He was born in Bologna in 1675 Before his elevation he had distinguished himself by extensive learning and by ability in the several offices of *promotor fidei* Bishop of Ancona (1727), Cardinal (1728), and Archbishop of Bologna (1731) Succeeding Clement XII, he began his pontificate in 1740, with

several wise and conciliatory measures, founded chairs of physics, chemistry, and mathematics in Rome, revised the Academy of Bologna, and instituted others, dug out the obelisk in the Campus Martius, constructed fountains, rebuilt churches, caused the best English and French books to be translated into Italian, and in many other ways encouraged literature and science His piety was sincere, enlightened, and tolerant, and his doctrines were well exemplified in his practice He was extremely anxious that the morals of the clergy should be untainted, and to that effect established a board of examiners for all candidates to vacant sees In proof of his toleration he showed the frankest kindness to all strangers visiting his capital, whatever the nature of their religious opinions The only accusation brought against him by his Roman subjects was "that he wrote and studied too much, but ruled too little," or left affairs of business too much in the hands of Cardinal Valentine After a painful illness, Benedict XIV died May 3, 1758 His most important works are that *On the Doctrinal Synod*, *On the Sacrifice of the Mass*, and *On the Beatification and Canonization of Saints*, a standard work, of which a part was translated under the title *Heroic Virtue* (3 vols, London, 1850) An edition of his writings was published under the care of the Jesuit Azevedo (12 vols, 1747-51), but more completely at Venice (15 vols, 1767), and at Prato (17 vols, 1839-46) His letters, written in Italian, to Carmo Peggi between 1729 and 1758, were published by F X Klaus (Freiburg, 1884, 2d ed as a biography by F Scusselli, with a bibliography, 1888) Some more of his letters, edited by B Manzoni, appeared at Bia in 1890 See also Pastor, *The History of the Popes* (London, 1906-1912), McWilliam, *A Chronicle of the Popes* (London, 1912)

BENEDICT OF ANIANE, or WITHIA (750-821) A French monk, born in Languedoc He entered the Benedictine Order in 774 and five years later founded a monastery on the banks of the river Anianus He devoted himself chiefly to the task of restoring the original principles of the order, and Louis le Debonnaire appointed him supervisor of all Frankish monasteries and decreed that the adoption of the rules advocated by Benedict should be binding upon the Benedictine Order throughout France He was canonized upon his death in 821, the 12th of February being dedicated by the Roman Catholic church to his memory

BENEDICT, DAVID (1779-1874) An American Baptist historian He was born at Norwalk, Conn, Oct 10, 1779 He graduated from Brown University, 1806, and was pastor at Pawtucket, R I, from 1806 till 1831, and then carried on an active ministry at large till his death there, Dec 5, 1874 He is remembered for his researches in Baptist history embodied in his *General History of the Baptist Denomination in America and Other Parts of the World* (New York, 1848) and *Fifty Years among the Baptists* (1860)

BENEDICT, FRANK LEE (1834-1910) An American novelist Of his numerous stories, the more noteworthy are *John Worthington's Name*, *Miss Van Kortland* (1870), *Her Friend Laurence* (1879), *The Price She Paid* (1883) His verses are collected in *The Shadow Worshipper and Other Poems* (1857) Mr Howells regards Benedict as having given evidence of

true genius. Consult Howells, *My Literary Passions* (1897), where Benedict is set almost in the front rank of American authors.

BENEDICT, SIR JULIUS (1804-85). A German-English musician and composer, born of Jewish parents in Stuttgart. He studied under Abbeille, Hummel, and finally Weber, who procured for him (1824) the post of music director of the Kärntnertheater in Vienna. In 1825 he obtained a similar position in the San Carlo theatre, Naples. Here he produced an opera buffa, *Giacinta ed Ernesto*, and in Stuttgart (1831) a serious opera, *I Portoghesi a Goa*. Both were failures. He appeared, however, with great success as a pianist in Paris in 1835, and later in London, where he settled, directing opera buffa at the Lyceum, in 1836. He was conductor of English opera at Drury Lane (1838), where his works, *The Gypsy's Warning* (1838), *The Bride of Venice* (1843), and *The Crusaders* (1846), were produced. After conducting opera in Covent Garden and at festivals, he went to America (1850) with Jenny Lind and, returning in 1852, resumed his work as teacher of the piano, composer, and conductor of the opera at Covent Garden, where his operatic masterpiece, *The Lily of Killarney*, created a furore in 1862. He wrote two symphonies and several cantatas (*Undine*, *Richard Cœur de Lion*, *Saint Cecilia*). His oratorio, *Saint Peter*, written for the Birmingham Musical Festival, 1870, met with extraordinary success. His operas have much dramatic and melodic beauty and in style and feeling are singularly English for compositions by a foreigner. He was knighted in 1871 and received many foreign decorations. Weber's biography, in Hueffer's *Great Musicians*, was written by Benedict.

BENEDICT, SAINT (480-c.543). The founder of monachism in the West. He was born of a rich and respected family at Nursia (now Norcia), 70 miles northeast of Rome, in 480 A.D. At an early age Benedict was sent to the schools of literature and jurisprudence in Rome, but soon grew dissatisfied with the sterile character of the instruction dispensed. Only in the devotions of religion, in the holy silence of solitary meditation, did Benedict see a safe refuge from the sins of the time, and the possibility of realizing a spiritual strength which would enable him to stem the tide of corruption that was setting in. He resolved to leave the city and betake himself to some deep solitude, and in pursuance of this resolution, he departed from Rome, at an early age (14, tradition says, 19 or 20, later studies make probable), and retired to a deserted country near the ruins of Nero's palace at the artificial lake of *Sublacum* (now Subiaco). Here, in a cavern (afterward known as the *Sacro Speco*), he dwelt for three years, until his fame spread over the country, and multitudes came to see him. He was now appointed abbot of a neighboring monastery, but soon left it, as the morals of the half-wild monks were not severe enough for his taste. This, however, only excited a livelier interest in his character, and as he lived in a period when the migration and interfusion of races and nations were being rapidly carried on, he could not fail to draw crowds of wanderers about him. Wealthy Romans also placed their sons under his care, anxious that they should be trained for a spiritual life. Benedict was thus enabled to found 12 cloisters, over each of which he placed a superior. He now sought another retreat, and, together with a few

followers, founded about 529 a monastery on Monte Cassino, afterward one of the richest and most famous in Italy. In 615 he is said to have composed his *Regula Monachorum*, in which he aimed, among other things, at repressing the irregular and licentious life of the wandering monks by introducing stricter discipline and order. It eventually became the common rule of all Western monachism. The monasteries which Benedict founded were simply religious communities, intended to develop a high spiritual character, which might beneficially influence the world. To the abbot was given supreme power, and he was told to acquaint himself in all his relations with the wisdom of God and of his Master. The discipline recommended by St. Benedict is, nevertheless, milder than that of Oriental monachism with regard to food, clothing, etc., but enjoins continual residence in the monastery and, in addition to the usual religious exercises, directs that the monks shall employ themselves in manual labors, imparting instruction to youth, copying manuscripts for the library, etc. By this last injunction St. Benedict, though this was not directly intended, preserved many of the literary remains of antiquity, for the injunction, which he gave only with regard to religious books, was extended afterward to many secular productions. It is remarkable that the founder of the most learned of all the monastic orders was himself so little of a scholar that St. Gregory the Great described him as being *scienter nesciens, et sapienter indoctus*—learnedly ignorant and wisely unlearned. St. Benedict died probably in 543. See MONASTICISM.

Bibliography. For editions of his rule, consult German, E. Wollfin, *B von Nursia und seine Monchsregel* (Leipzig, 1895), English, G. F. Henderson, *Historical Documents of the Middle Ages*, pp. 274-314 (London, 1892). In general, consult E. Spreitzenhofer, *Die historische Voraussetzungen der Regel des heiligen Benedict von Nursia* (Vienna, 1895), and for his biography, F. C. Doyle, *The Teachings of St. Benedict* (London, 1887), Lechner, *Life and Times of St. Benedict* (London, 1900), also his *Life* by Gregory the Great (Old English translation, edited by P. W. Luck, London, 1880) and J. G. Waitzmann (Augsburg, 1835).

BENEDICT, WAYLAND RICHARDSON (1848-). An American author, educator, and clergyman, born at Rochester, N. Y., and a graduate of the University of Rochester (A.B. 1865, A.M. 1868). After finishing his undergraduate studies he spent several years as a teacher in various secondary schools, was trained for the Baptist ministry at the Rochester Theological Seminary, and spent an additional year of study abroad at the University of Gießen. It was not, however, to pastoral but to educational work that he devoted the greater part of his active life, for after two years as minister of a Mt. Auburn, Ohio, church, he accepted a chair in the University of Cincinnati (1875). There he remained for 32 years, at various times during his service acting as professor of philosophy, history, psychology, and logic, and as dean. In 1907 he retired as professor emeritus. Among his numerous works on a variety of subjects are *The Nervous System and Consciousness* (1885), *Theism and Evolution* (1896), *Outlines of the History of Education* (1888), *Ethics and Evolution* (1889); *New Studies in the Beatitudes* (1890), *Religion*

as an *Idea* (1903), *Greek Thought Movements and their Ethical Implications* (1905)

BENEDICT ACCOLTI, ak-kôl'tâ See ACCOLTI BENEDETTO

BENEDICT BIS/COP (c 620-690) An English ecclesiastic of the seventh century, who exercised a most important and beneficent influence on Anglo-Saxon civilization and learning. He was born about the year 620, of a noble Northumbrian family (his patronymic, according to Eddius, being Baducing), and until about his 25th year was a courtier of Oswiu, King of Northumbria. About that time he gave up his court life and accompanied Wilfrith to France, whence he went on to Rome (654), where he spent about 10 years in study and whence he seems to have returned soon after the Synod of Whitby in 664. In 665 he was in Rome a second time, being sent on a mission by Alchfrith, King of Northumbria. After a stay in Rome of a few months he proceeded to the island of Lerins, where he became a monk and spent about two years, thus acquiring a knowledge of monastic discipline. He returned to Rome in 667, came to England with Theodore and Adrian, and was made abbot of the Monastery of St Peter (afterward that of St Augustine) in Canterbury. This charge he resigned two years later and went to Rome for a third time, for the purpose of bringing home the literary treasures which he had already collected. He returned about 672, bringing with him a large collection of valuable books, and repaired to Northumbria, where he founded the famous Monastery of Wearmouth. Workmen were brought from France to build and glaze the church and monastery, this being one of the earliest instances of the use of glass for windows in England. He also introduced from Gaul and Rome (which he visited again in 687) church utensils and vestments, relics, pictures, images, and again a vast number of books. He also introduced the Roman choral service. Benedict made his fifth and last journey to Rome in 687 and, as on former occasions, came home laden with books and pictures. Shortly after his return from Rome he was seized with palsy, under which he languished three years, dying on the 12th of January, 690. During his long illness he often anxiously exhorted his monks to look carefully after his books and to preserve them from loss or injury.

The benefits conferred by Benedict on Anglo-Saxon civilization and the impulse given by his labors to Anglo-Saxon learning, were greater than can now be estimated. It is not certain that he wrote any books, and those ascribed to him are of little value, but by his personal teaching, and especially by his founding at Wearmouth such a valuable and for the time extensive library, he implanted in the nation a taste for literature and learning, which soon was fruitful in results and continued to be so for many centuries. Bede, a pupil, wrote his life.

BENEDICT COLLEGE A coeducational institution for negroes at Columbia, S C, conducted under the auspices of the American Baptist Home Mission Society. It was founded as an institute in 1871 and incorporated as a college in 1894. It provides elementary, high school, and collegiate instruction, and courses for the ministry. All work on the campus is performed by students, and the courses are designed to make the students self-supporting.

The college occupies 11 buildings and has an endowment of \$127,000. Its student enrollment in 1913 was 626, when the instructors numbered 30 and the library contained 8000 volumes. President, Rev. B. W. Valentine.

BENEDICTINE, bèn'e-dik'tin A liqueur distilled at Fecamp (qv) in France. It gets its name from the fact that it was originally manufactured by the Benedictine monks. Since the French Revolution, however, the preparation has been in the hands of a secular company, and the components entering into its preparation are considered a trade secret. It is believed by some that the volatile constituents of cardamom seeds, arnica flowers, angelica root, lemon peel, thyme, nutmegs, cassia, hyssop, peppermint, and cloves enter into its composition. Several firms doing business with essential oils and other volatile plant constituents prepare and sell mixtures which are supposed to contain the essential principles of benedictine. These mixtures, or so-called extracts, go to make up the bulk of the imitations of benedictine which are sold in various parts of the world, especially in those countries where the food, drug, and beverage laws are lax or not rigidly enforced. See LIQUEUR.

BENEDICTINE EDITIONS OF THE FATHERS Scarce and costly volumes containing the works of Barnabas, Lanfranc, Bernard, Anselm, Augustine, Cassiodorus, Ambrose, Hilary, Jerome, Athanasius, Gregory of Tours, Gregory the Great, Hildebert, Irenæus, Lucius Cæcilus, Chrysostom, Cyril of Jerusalem, Basil, Cyprian, Justin Martyr, Origen, and Gregory Nazianzen—in all, 61 volumes. So called because edited by scholars of the Benedictine Order of monks in the seventeenth and eighteenth centuries.

BENEDICTINES The general name of the monks following the rule of St Benedict. The first Benedictine monastery was founded at Monte Cassino, in the Apennines about midway between Rome and Naples, by St Benedict himself, about 529. It was partly modeled on what he had learned of the earlier Eastern monasticism, but differed from that in giving greater prominence to the community idea, while the monks of the East had tended more to live a solitary life. In Benedict's idea the monastery was to be to the monk what the family was to persons living in the world—an ordered home, with reciprocal duties and claims. Each monastery formed a separate community, with its own internal organization, the founder did not legislate for a world-wide organization, like the mendicant orders or the Jesuits. In fact, strictly speaking, he did not found an order, but laid down a rule by which to govern a state of life. The earlier monasticism differed from the later in having no relation to the clerical state, most of the monks and even some abbots were laymen at the first. The vows taken by those who joined a Benedictine monastery were originally three—of stability, i.e., to remain attached to the monastery, not to wander at will, of conversion of life, i.e., to labor until death to attain the perfection of the state to which they were called, and of obedience to their superiors.

The order increased so rapidly that after the sixth century the Benedictines must be regarded as the main agents in the spread of Christianity, civilization, and learning in the West. The provision of the rule for incessant industry resulted, among other things, in the

promotion of systematic agriculture and the reclaiming of large tracts of land which would otherwise have lain waste. Without them the continuity of Christian art, like that of Christian literature, would doubtless have been broken in the West. In the Dark Ages between the seventh and eleventh centuries, when confusion and barbarism prevailed in the political and social spheres, the artistic tradition which had been carried on by the bishops was taken up by the great monasteries of this order, and they also afforded the only common meeting ground for sharply distinct social classes, thus exerting a unifying influence upon the new nationalities then springing into life.

Each of these establishments was a world in itself. It included not only fully professed monks, but lay brothers, or *conversi*, who had greater freedom of movement and occupation. The high wall of the monastery inclosed a great variety of structures centring around the church, to which were attached, generally on the right side, the principal group of monastic buildings—the dormitories above (one for choir brothers and one for *conversi*) and the refectory, chapter house, and general hall, library, kitchen, storerooms, etc., all grouped about a main cloister. Then there were other groups, one in particular with a hospital, a chapel and cloister for convalescents, doctor's quarters, and the like, another group for the schools and for teaching of arts and trades, sometimes another devoted to the external laity with a hospice, refectory, chapel, stable, and barns. A drawing of about the year 820 shows the plan of the projected buildings at Saint Gall (q.v.), altogether the most elaborate known, where everything is labeled with a detailed description, even to the garden devoted to growing herbs and simples for the doctor's pharmacopoeia, and the workshops assigned to the different arts and trades. The weaving and dyeing of cloth, the curing and tanning of skins, were followed by the work of the tailor, the shoemaker, and the embroiderer. The preparation of vellum led up to writing, illuminating, and binding of manuscripts. Glass blowing was practiced from its commonest to its most artistic developments. Carpentry and joinery, masonry in brick and stone, were taught practically in construction. Then came the more purely artistic occupations of bronze casting and hammering, work in gold, silver, and silver gilt, ivory, wood, and gem carving, enameling and inlaying, layer sculpture, fresco painting, and sometimes mosaic work. No known branch of art or industry was neglected. One monk was usually at the head of this entire department, with others in charge of the subdivisions, but often lay brothers were at the head—all were admitted equally in these branches.

It cannot be said that the Benedictines accomplished any great progress in architecture. They adhered to the old basilican style (see BASILICA), often replacing the antique columns, which had become scarce, by plain square piers or built-up shafts. They showed a certain poverty of architectural detail and of sculptured ornament, except at the very close, in the eleventh and twelfth centuries. On the other hand, they always maintained a mastery of fresco painting.

While, as has been said, the order had the very greatest influence on the preservation of learning throughout the West, its chief literary glories are associated with the Congregation of

Saint-Maur in France, founded by letters patent of Louis XIII, in 1618, which had later its chief seat at Saint Germain-des-Près, near Paris. When the Order of the Benedictines was suppressed, with the other religious orders, by the Revolution in 1792, its splendid conventual buildings were destroyed. Numbering among its monks such scholars as Mabillon, Montfaucon, Sainte-Martha, D'Achezy, Martene, Durand, Rivet, Clemencet, Carpentier, Toussaint, Constant, and Tassin, it rendered services to literature which would be difficult to overestimate. Besides admirable editions of many of the Fathers (see BENEDICTINE EDITIONS OF THE FATHERS), the world of letters owes to these men the *Art de vérifier les dates* (3 vols., fol., 1783-87), a much enlarged edition of Ducange's *Glossarium Mediae et Infimae Latinitatis* (6 vols., fol., 1733-36), a supplement (1760, 4 vols., fol.), the *De Re Diplomatica* (1681 and 1709, fol.), the *Nouveau traité de diplomatique* (6 vols., 4to, 1750-65), *L'antiquité expliquée* (15 vols., fol., 1719-24), the *Monuments de la monarchie française* (5 vols., fol., 1729-33), the *Acta Sanctorum Ordinis S. Benedicti* (9 vols., fol., 1688-1702), a new and much improved edition of the *Gallia Christiana* (14 vols., fol., 1715-56), the *Annales Ordinis S. Benedicti* (6 vols., fol., 1713-39), the *Vetustum Scriptorum Spicilegium* (13 vols., 4to, 1653-77), the *De Antiquis Monachorum Ritibus* (2 vols., 4to, 1690), the *De Antiquis Ecclesiarum Ritibus* (3 vols., 4to, 1700-02), the *Vetustum Scriptorum et Monumentorum Amplissimum Collectio* (9 vols., fol., 1724-33), and the *Histoire littéraire de la France* (9 vols., 4to, 1733-49). Since the Revolution the revived French Benedictines, until troubled by recent government interference, had resumed some of the unfinished labors of the Congregation of Saint-Maur: that of Solesmes, established in 1837, under the direction of Dom Guéranger, Cardinal Pitra, and others, has entered on literary enterprises of its own, such as the *Spicilegium Solesmense* (10 vols., 4to), and has also been famous for its revival of the ancient ecclesiastical music in all its purity.

By degrees, however, corruption of manners began to accompany increasing wealth, until it became the practice in many places to receive almost exclusively the sons of noble and wealthy persons as novices among the "black monks." Several of the Popes attempted to regulate these disorders, and reforms of great consequence sprang from within the bosom of the order itself. The first serious inroad into the influence of the regular Benedictines was made by the reform of Cluny (q.v.), under Abbot Odo, in 927, but as it did not break away from the order, it really gave it new life and splendor. The mother house of Cluny was an immense establishment with a church, destroyed at the Revolution, larger than any Gothic cathedral, a superb specimen of Romanesque. The patronage of the arts by this house and the 800 or more monasteries affiliated with it was offensive to St. Bernard, who objected to the lavish expenditure for great church towers, elaborately sculptured façades and capitals, rich hangings and vestments, and treasures filled with sacred vessels of gold and silver. From him came the spread of the reform of Cîteaux (see CISTERCIANS) in 1098. The new spirit was less literary, less exclusive, the arts and industries were not so thoroughly cultivated within the precincts. Greater opportunity was offered to lay

artists, the *conversi* were encouraged to break loose and form associations of artists who competed with the monastic artists. This culminated during the twelfth century, which witnessed not only the transition to the Gothic style of art, but the transference of artistic supremacy from monastic to secular hands. Another famous reform on stricter lines was that of the Tappists (qv), in 1664, an offshoot from the Cistercians.

At one time the order is said to have had no less than 37,000 monasteries, in the fifteenth century 15,107 are enumerated, of which the Reformation abolished a great many. In England, at the Dissolution under Henry VIII, there were (as given by Tanner, *Notitia Monastica*, 1695) 113 abbeyes and priories for monks, and 73 houses of Benedictine nuns. They now have less than a score in that country. In the United States the order was introduced in 1846, by a colony from the famous Abbey of Metten, in Bavaria, St Vincent's Priory, Latrobe, Westmoreland Co., Pa., made an abbey in 1855, being the first foundation. In the older days the most important monasteries for wealth, possessions, and patronage of art and literature were in Italy, Monte Cassino, Cava de' Tirreni, Farfa, Bobbio, Nonantula, and Subiaco, in Germany, Fulda, Corvey, Saint Gall, Hirsau, and Reichenau, in France, Saint-Denis, Saint-Martin of Tours, Corbie, Fontenelle, Saint-Bénigne of Dijon, in England, Jarrow and Wearmouth. Before the Reformation many of the mitred abbots in the last-named country sat in the House of Lords with the bishops. The abbot of St Augustine's, Canterbury, was the first to obtain these rights of *pontificalia* from Pope Alexander II in 1063. See ABBOT.

For the history of the order, consult the *Annales Ordinis S. Benedicti et Acta Sanctorum Ordinis S. Benedicti* already referred to, Koyner, *Apostolatus Benedictinorum in Anglia* (Douai, 1626), the *Bullarium Cassinense* (2 vols., fol., Venice, 1650), Tassin, *Histoire de la Congrégation de Saint-Maur* (Paris, 1770), *Ordo del orden de San Benito* (7 vols., fol., Salamanca, 1609-15), Montalembert, *Monks of the West* (Eng. trans., 6 vols., by Gasquet, London, 1895), Gasquet, *English Monastic Life* (London, 1904), Taunton, *The English Black Monks of the Order of St. Benedict* (London, 1897), Dantier, *Études sur les Bénédictins* (Paris, 1864), *Les monastères bénédictins de l'Italie* (Paris, 1866). For the artistic side, consult more particularly Schlosser, *Die abendlandische Klosteranlage des fruhen Mittelalters* (Vienna, 1889), Lenoir, *L'architecture monastique* (Paris, 1852), Springer, *Klosterleben und Klosterkunst* (Bonn, 1886). The methods of the monastic schools for all branches of art except architecture are best recorded in the interesting technical manual of the eleventh century called *Diversarium Artium Schemata*, by a monk named Theophilus. Many contemporary annals of the monasteries are published in the *Monumenta Germaniae Historica* of Pertz and in Muratori's *Scriptores Rerum Italicarum*. For a vivid picture of life in an English monastery, consult Carlyle, *Past and Present*.

BENEDICTION (Lat. *benedictio*, a praising, blessing, from *bene*, well + *dicere*, to speak). A solemn invocation of the divine blessing upon men or things. The ceremony in its simplest form may be considered almost coeval with the earliest expressions of religious feeling. In the Eastern as well as the Western church it is a

common ceremony. The benediction, however, is not confined to a form of prayer, but is accompanied with sprinkling of holy water, the use of incense, the sign of the Cross, etc. The chief cases in which a benediction is bestowed are the coronation of kings and queens, the confirmation of all church dignitaries, and the consecration of church vessels, bells, and sacred robes, the nuptial ceremony, the absolution, and the last sacrament. The most solemn form of benediction in the Roman Church is that "with the most holy sacrament," which is administered by the bishop or priest with the monstianse or ostensorio containing the consecrated elements. Besides these, lands, houses, cattle, etc., often receive a benediction from the priest. In the Greek church, when the benediction is being pronounced, the priest disposes his fingers in such a manner as to convey symbolically to the faithful who are close enough to observe the arrangement the doctrine of the Trinity and the twofold nature of Christ.

BENEDICTISSON, VICTORIA MARIA. See AHLGREN, ERNST.

BENEDICTUS (Lat. *blessed*, praised). A portion of the service of the mass of the Roman Catholic church, also the so-called "canticle of Zachary" (Luke 1:68-79) used in the Roman breviary at lauds and adopted into the Anglican morning service.

BENEDIX, bē'ne-diks, RODERICH JULIUS (1811-73). A German playwright. He was born in Leipzig and had a wandering career with the celebrated Bethmann troupe—by turns actor, opera singer, dramatic author, theatrical manager, and editor of a literary journal. His dramatic works fill 27 volumes (Leipzig, 1846-74). Of his one-act comedies and monologues, 46 are collected in his *Haustheater* (2 vols., 10th ed., 1891). The best of the longer plays are *Das demooste Haupt* (1841), *Der Liebesbrief*, and *Di IVespe*. Of the shorter comedies, *Der Prozess*, *Der Weiberfeind*, *Gunstige Vorzeichen*, and *Die Sonntagsjäger* are favorites in Germany and America. Benedict's plays are healthy in tone, simple in structure, lively in wit, and robust in humor, usually farcical and frequently burlesque, showing always an intimate knowledge of stage technique that contributed greatly to their lasting success. After his death appeared *Die Shakespearmanie* (1873), in which he challenges the adulation of the English poet. For his autobiography, see the *Gastelauho* (1871).

BENEFICE, ben'e-fis (ML. *beneficium*, a fief, Lat. *beneficium*, favor, from *bene*, well + *faceri*, to do). In the feudal system of land tenure (see FEUDALISM) a grant of land by the lord to a vassal to be held by the latter on certain terms of service, in its later history the term was identical in meaning with fief (qv), or feud (qv). In this sense it has become obsolete, however, and it is now in England used almost exclusively to denote an ecclesiastical preferment or living. It has no reference to the dignity or office of the incumbent, but describes the beneficial property right enjoyed by him by virtue of his office. The right to appoint a curate or vicar to a benefice is in itself a species of property and is enumerated by Blackstone among incorporeal hereditaments. See ADVOWSON, PATRONAGE, also consult Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895).

BENEFICIARY, ben'e-fish'1-a-ri (Lat. *bene-*

ficiarius, pertaining to a favor. See BENEFICE. A legal term applied to the holder of a benefice or fief (qv). The word is employed to a large extent in American and later English law as a substitute for *cestui que trust*, a technical term of equity jurisprudence derived from the Norman French, to denote a person in the enjoyment of an interest or estate held in trust by others. The legal title to a trust estate being vested in the trustee, the interest of the beneficiary therein is variously described as the 'beneficial estate' or the 'equitable estate.' It is in this sense of a person entitled to the benefits of a trust estate that the term "beneficiary" is technically used in the law of Scotland. As a term in the law of insurance, the beneficiary is the party entitled to the benefit or proceeds of the policy. Patent rights and copyrights are sometimes denominated beneficiary privileges. See TRUST.

BENEFICIUM See BENEFICE

BENEFIT OF CLERGY (ME *bienfet*, OF *bienfet*, from Lat *bene*, well + *factum*, something done, a deed, act), or PRIVILEGIUM CLERICALE. The privilege, claimed by the Medieval Church for its clergy, of exemption from the process of the secular courts when charged with crime. The privilege was generally accorded by the Christian nations of Europe, and it operated to render the clergy amenable, especially in cases involving barbarous punishments, only to the authority of the Church. The ancient usage was, says Blackstone, "for the bishop or ordinary, to demand his clerks to be tried in the bishop's instead of the King's court." This exemption, enjoyed by all persons in holy orders, from the jurisdiction of the secular or ordinary tribunals, was a privilege highly valued and stoutly defended by the clergy. This sentiment was powerfully supported by the growing sense of the sanctity attaching to the priestly office, and the result was the creation of a priestly caste owing allegiance primarily to the Church and subject only to her penalties.

In England the privilege was conceded in all cases of felony, except that of treason against the King, but not in cases of misdemeanor nor in civil litigations. Originally available only in the case of persons in holy orders, it was extended in 1330, by a statute of Edward III to all clerks, whether religious or secular, the last class comprehending all persons who could read. The gradual amelioration of the penal laws and the spread of education rendered the benefit of clergy more and more of an anachronism, and it was, by successive acts of Parliament, gradually shorn of its privileges and finally, in 1827, abolished. It survives only in the statute forbidding the judicial impeachment of archbishops or bishops for crime without the consent of the King, and in the exemption of the clergy from arrest while in the performance of the services of the Church.

The process whereby the benefit was claimed varied with the growing power of the ordinary tribunals. Originally the bishop was entitled to demand the person of the clerk immediately upon his apprehension, whereupon the jurisdiction of the secular authority ceased. Later the courts asserted the right to compel the presence of the accused, in order to inquire into the question of his guilt or innocence, as well as his right to the privilege, and finally the courts took full jurisdiction and proceeded against him as in the case of an ordinary criminal, until a verdict was

rendered, when he was allowed to plead his benefit in arrest of judgment. (See ARREST OF JUDGMENT.) The test of the prisoner's ability to read was thereupon made in open court, and if his claim was sustained, he was turned over to the bishop, or ordinary, to make his purgation. (See COMPROGATION.) The punishment of branding on the thumb, which the secular court was authorized to inflict before discharging the convicted clerk from its custody, was mitigated and finally abolished by Statute of 19 Geo III (1779).

In the United States the right was recognized in a few early cases in the Colonies of North Carolina, South Carolina, and Virginia. It was expressly forbidden by an Act of Congress passed April 30, 1790, in all cases of conviction of capital crime. The early history of the practice in England is fully given in Pollock and Maitland, *History of English Law* (2d ed., Boston, 1890). For its later history, consult Hale, *History of the Pleas of the Crown*, Blackstone, *Commentaries on the Law of England*; Stephen, *History of the Criminal Law of England* (London, 1883).

BENEFIT OF INVENTORY A term of the civil law denoting the privilege which the heir obtains of being released from liability for the debts and obligations of his ancestor beyond the value of the assets coming to him, by making and filing an inventory of these assets within the time and in the manner prescribed by law. By the earlier Roman law the heir (*heres*), whether inheriting property or not, was absolutely liable for the debts of his ancestor. It was not until the time of Justinian that this liability was restricted to the value of the assets received by him in the manner above stated. Benefit of inventory is still employed in the practice of Louisiana, which inherited the civil law through the Code Napoleon. It was formerly of importance also in Scotch law, but by the abolition of the *annus deliborandi* and other liberal provisions of the statutes 10 and 11 Vict., c 47, secs 23 and 25, its value has been minimized. See HEIR, INHERITANCE, INVENTORY.

BENEFIT SOCIETIES Associations formed to provide for a cheap form of insurance, which secures to their members, through regular dues or special assessments, a provision for old age, funeral expenses, death payments to widow and orphans, or sick allowances. Societies exist with this beneficial feature as their primary object, but more often it is added to the work of special associations in order to make membership more attractive. The associations formed by men in the same business or profession, trade organizations, philanthropic societies, and churches frequently provide for such a fund. Certain trades unions tend to emphasize the benefit feature, sometimes paying out-of-work allowances. Women are permitted to belong to some societies. Since the success of all such societies depends upon the financial management, the funds have been occasionally dissipated by ignorance, incompetence, or fraud. In England, societies with beneficial features are called "friendly societies," and "benefit societies" are associations entered into for the purpose of raising by periodical subscriptions a fund to assist members in buying land and erecting buildings upon it. The latter societies have been very successful, and they have invested large sums in bonds and mortgages. See BUILDING AND LOAN ASSOCIATIONS, SECRET

ASSOCIATIONS, FRIENDLY SOCIETY, INSTITUTIONAL CHURCH, PENSIONS, RAILWAY BROTHERHOODS, TRADES UNIONS Consult F H Bacon, *Law of Benefit Societies and Life Insurance* (St Louis, 1905)

BENEKE, bá-ne-ke, FRIEDRICH EDUARD (1798-1854) A noted German psychologist He was born in Berlin, Feb 17, 1798 He studied theology at Halle and afterward philosophy at Berlin In 1820 he began lecturing at the latter university, but two years later his lectures were interdicted by the Minister Altenstein Beneke then held a position as lecturer at Göttingen for three years until in 1827 he was allowed to resume lecturing in Berlin Upon the death of Hegel in 1832 he was appointed assistant professor of philosophy On March 1, 1854, he disappeared from his home, and his corpse was discovered in the canal at Charlottenburg in June 1856

Beneke's most important works were his psychological treatises His standpoint throughout was empirical, opposed to Hegelian speculation, and closely allied to British associationism He believed that a true psychology, which is the basis of all knowledge, must be formulated in accordance with the rigid methods of physical science and that the genetic method is most valuable Despite this empirical vein he found the elements of mind in certain formal capacities, termed the "primal faculties" His work is often theoretical and inexact

His principal works are *Erfahrungssocielenlehre, als Grundlage alles Wissens, in ihren Hauptzügen dargestellt* (1820), *Neue Grundlegungen zur Metaphysik* (1822), *Psychologische Skizzen* (1825-27), *Lehrbuch der Psychologie als Naturwissenschaft* (1833, 4th ed, 1877), *Erziehungs- und Unterrichtstheorie* (2 vols, 1835-36, 4th ed, 1876), *System der Logik als Kunstlehre des Denkens* (2 vols, 1842), *Pragmatische Psychologie, oder Seelenlehre in der Anwendung auf das Leben* (2 vols, 1850) Consult C H T Kuhn, *Die Sittenlehre F E Benekes* (1892), Brandt, *Beneke, the Man and his Philosophy* (New York, 1895), H Renner, *Benekes Erkenntnistheorie* (Halle, 1902), A Wandschneider, *Die Metaphysik Benekes* (Berlin, 1903)

BENEGELI, bá-nén-íá-él, CID HAMET The name of the old chronicler whose work Cervantes pretends to have used in his *Don Quixote*

BEN'ET, STEPHEN VINCENT (1827-95) An American soldier, born in St Augustine, Fla He graduated at the University of Georgia, and in 1849 at West Point, where he was assistant professor of geography, history, and ethics from 1859 to 1861, and was instructor of ordnance and the science of gunnery from 1861 to 1864 He was appointed assistant to the chief of ordnance in 1869, and from 1874 until his retirement in 1891 was chief of the department with the rank of brigadier general He translated Jomini's *Political and Military History of the Campaign of Waterloo* (1853), and in 1862 published *Military Law and the Practice of Courts-Martial*

BEN'EVEN'TO (for derivation, see below) An archiepiscopal city in south Italy, capital of the province of Benevento (Map Italy, J 6) It is situated on a hill between the rivers Calore and Sabato, on the winding Naples-Poggia Railway, 60 miles by rail northeast of Naples, but only 32 miles by direct route The walls are constructed almost entirely from Roman ruins, and on the north side of the town is Trajan's

triumphal arch, the Porta Aurea, one of the best-preserved Roman structures in south Italy, erected in 114 A D in expectation of the Emperor's return from the East, where he died in 116 It is 50 feet high, and is built of Greek marble The twelfth-century Lombard-Saracenic cathedral contains beautiful paintings and has a bronze door adorned with reliefs of New Testament subjects and said to have been made in Constantinople in 1150 There are several fine palaces, a castle, erected in the fourteenth century, and several churches, among which may be mentioned that of Santa Sofia, a circular edifice of the Lombard period In the cathedral is a relief showing the Calydonian boar adorned for sacrifice Egyptian obelisks have been set up in many of the public squares The principal manufactures are of gold and silver-plated ware, leather and parchment, and the trade in grain is important

According to tradition, the Samnite *Maleventum* (Lat ill wind, or ill-come), the name of which was changed to *Beneventum* (fair wind, or well-come) after the Roman victory over Pyrrhus in 275 B C, was founded by Diomedes During the Punic wars Beneventum remained faithful to the Romans and was plundered by Hannibal after his victory at Cannae 216 B C It was destroyed by Totila in 545 A D, and was rebuilt by Narses In the sixth century the Lombards made it the capital of an independent duchy, of which Pope Leo IX in 1049 had the possession guaranteed to him by Emperor Henry III Frederick II partly destroyed it in 1241 From 1806 to 1815 Benevento was the capital of a principality granted to Talleyrand by Napoleon In 1815 it was restored to the Pope and in 1860 became part of the Kingdom of Italy Five councils were held here in the eleventh and twelfth centuries Pop (commune), 1881, 22,000, 1901, 24,647, 1911, 23,767 Consult Boigia, *Memorie storiche della pontificia città di Benevento* (Rome, 1763-69), A Mommius, *Monumenti e Opere d'Arte di Benevento* (Benevento, 1899)

BENEVENTUM. See BENEVENTO

BENEVOLENCE (Lat *benevolentia*, good will from *bene*, well + *velle*, to wish) In English legal history, a compulsory contribution levied by certain kings, without other authority than the pretense of piety The designation dates from 1473, when Edward IV asked it "as a mark of good will towards his rule" Benevolences were declared illegal by Parliament in 1484, but nevertheless were resorted to with considerable success by Henry VII and Henry VIII Subsequent kings tried the expedient with ill success, and Charles I declined to resort to it The people protested against it in the Petition of Rights, etc, and it has been made illegal without grant of Parliament Consult Hallam's *Constitutional History of England*, and Stephen's *Commentaries*, vol 1 (4 vols, New York, 1843-46)

BEN'EZET', ANTHONY (1713-84) An American philanthropist who defended the interests of the negroes and Indians He was born in France, but emigrated to America, and in 1731 settled in Philadelphia Among his tracts were *A Cautron to Great Britain and Her Colonies, in a Short Representation of the Calamitous State of the Enslaved Negroes in the British Dominion* (1767), *Some Historical Account of Guinea, with an Inquiry into the Rise and Progress of the Slave-Trade* (1774), *A Short*

Account of the Society of Friends (1780), and *Observations on the Indian Natives of this Continent* (1784). Consult Roberts Vaux, *Memoir of the Life of Anthony Benzeet* (Philadelphia, 1817).

BENFEY, lén'fi, THEODOR (1800-81). A German Orientalist, born at Norten, Hanover. He studied at Gottingen and Munich, from 1834 was a lecturer at the former university and from 1848 professor. His researches in the Sanskrit language and literature were particularly extensive and valuable. In the introduction to his translation into German (2 vols, 1859) of the collection of fables known as *Pancatantra* (qv), he began a most interesting study of the influence of ancient Indian material upon the folklore of Asia and Europe. This investigation he continued in his periodical *Orient und Occident* (published at Gottingen in 1863-65, 3 vols), and in his introduction to G. W. H. Bickell's edition and translation into German (Leipzig, 1876) of the Syrian *Kahilag* and *Damag*. He thus opened to other scholars a most profitable field. In English he published a *Practical Grammar of the Sanskrit Language* (1863, 2d ed, 1868), and a *Sanskrit-English Dictionary* (1866), by which he is probably best known. His writings further include an etymological dictionary of the Indo-Germanic languages (in 2 vols), a valuable edition, with a glossary and a translation into German (1848), of the *Sāmaveda*, and a *Vollständige Grammatik der Sanskritsprache* (1852), supplemented by a *Chrestomathie* (1853-54). His *Kleinere Schriften*, edited by Adalbert Bezzenberger, appeared in Berlin in 1890-91 (2 vols).

BENGAL, bēn-gn' (Hind *Baṅgālā*, Skt. *Tāṅgalam*, from *Vaṅga*, one of the five Aryan kingdoms). A province of India forming a presidency since 1912. It is bounded on the north by Bhutan and Assam, on the east by Assam and Burma, on the south by the Bay of Bengal, and on the west by the province of Bihar and Orissa (Map India, E 4). Radical changes in boundary occurred in 1905 and 1912. An unofficial estimate of the province as newly constituted places the area at about 70,000 square miles and the population at about 42,000,000. Prior to Oct 16, 1905, the province (then a lieutenant governorship) had an area of 196,408 square miles, of which 157,796 square miles were British territory and 38,612 square miles native states, it consisted of the four sub-provinces—Bengal proper, Bihar, Orissa, and Chota Nagpur (including the native states of Cooch Behar, Sikkim, Hill Tippera, and the tributary states of Orissa and Chota Nagpur), and the total population, according to the census of 1901, was 78,493,410. This territory was about the same as the Diwani grant of 1765. The area of the lieutenant governorship before and after the territorial division of 1905, with the 1901 census population, was as follows:

	BEFORE OCT 16, 1905		AFTER OCT 16, 1905	
	Sq. m.	Pop 1901	Sq. m.	Pop 1901
Bengal proper	84,728		35,576	
Bihar	44,259		43,524	
Orissa	24,306		41,789	
Chota Nagpur	43,115		27,703	
Total	196,408	78,493,410	148,592	54,662,529
British territory	157,796	74,744,866	115,819	50,722,067
Native States	38,612	3,748,544	32,775	3,940,462

These changes of boundary were made to lighten the excessive burden imposed upon the Bengal government by increasing population, commerce, and complexity of administration. It was decided that relief could be afforded, not by organic governmental change, but only by actual transference of territory. Hence a new province, Eastern Bengal and Assam, was erected, to it was assigned Eastern Bengal, i. e., the territory generally east of the Madhumati River and the Ganges and including the Bengal divisions of Dacca, Chittagong, and Rajshahi (except Darjeeling), the district of Malda, and the native state of Hill Tippera. At the same time the five Hindi-speaking native states of Jashpur, Surguja, Udaipur, Korca, and Chang Bhakar were transferred to the Central Provinces, while the district of Sambalpur (except two zamindaris) and the Oriya-speaking native states of Patna, Kalahandi, Bania, Sonpur, and Raurakhol in the Central Provinces were attached to Bengal. Minor territorial changes (as the detachment of Sikkim), aggregating no very considerable alteration in area or population, took place between 1905 and 1911, the returns by divisions of the census taken on March 10 of the latter year, as compared with the adjusted returns of the 1901 census (for the same territory), together with the percentage of increase, are shown below:

	Pop 1901	Pop 1911	Inc.
British Territory			
Burdwan Division	8,240,076	8,467,314	2.8
Presidency	8,983,818	9,445,321	5.1
Patna "	5,847,371	5,634,780	-0.2
Tirhut "	9,888,018	9,973,359	1.1
Bihar "	5,063,940	5,410,371	3.9
Orissa "	4,489,142	5,131,763	3.0
Chota Nagpur Division	4,900,429	5,605,362	14.4
Total	50,715,794	52,668,269	3.8
Native States			
Cooch Behar	566,974	592,952	4.6
Orissa Feudatory States	3,173,395	3,796,563	19.6
Chota Nagpur States	141,079	148,646	5.4
Total	4,881,448	4,538,161	16.9
Grand total	54,597,242	57,206,430	4.8

Of the total population of the province as constituted in 1901, about 63 per cent was returned by the census of that year as Hindu and about 33 per cent as Mohammedan. Hindus were most numerous in Bihar (except Malda and East Purnea), Orissa, and West Bengal, and Mohammedans in the districts east of the Bhagarathi and the Mahananda. In British territory Hindus numbered 46,737,543, Mohammedans 25,265,342, and Animists 2,242,770. The Mohammedans of the old province formed over two-fifths of the total number in India. The 1901 census showed that in the British territory of the old province Bengal was spoken by 40,714,099 persons, Hindi 26,151,361, Oriya 4,561,323, and Santali 1,510,881.

Of the total population of the province as constituted at the 1911 census, 52,668,269 in British territory and 4,538,161 in native states. Hindus numbered 40,289,843 and 3,797,979, Mohammedans, 9,885,763 and 199,133, Animists, 2,005,992 and 499,952, Christians, 319,384 and 38,530.

The province as reconstituted Oct 16, 1905, for administrative purposes, by the division of

old Bengal and other changes mentioned above, did not prove satisfactory to the inhabitants, the division was regarded as an attempt to weaken the national political and religious feeling, and it had considerable bearing on the native "unrest" of the ensuing years. A new shifting of boundaries was determined upon. On April 1, 1912, in accordance with the announcement of the Emperor at the Delhi Durbar (December, 1911), and under a subsequent act of Parliament, Eastern Bengal was reunited to Bengal (Assam becoming again a separate province), while Bihar, Chota Nagpur, and Orissa were separated to form a new province (lieutenant governorship), and the new province of Bengal was at the same time raised to the rank of a presidency, under a governor with powers and privileges similar to those of the governors of Madras and Bombay. The legislative council was enlarged to consist of 52 members, including 25 elected by variously constituted constituencies, in the total were 20 Hindus and 7 Mohammedans. Calcutta (which was superseded by Delhi as the capital of India) remained the capital of Bengal, with Darjeeling as the summer residence of the governor, and it was provided that Dacca, former capital of Eastern Bengal and a centre of Islam, should be the administrative headquarters for a certain period each year. As stated at the beginning of this article, a statistical treatment of the new presidency was not feasible in 1913.

In its topographical conformation Bengal before the division of 1905 was considered as consisting of two river valleys, the western part forming the basin of the Ganges, and the eastern part of the Brahmaputra. While in the northern part the surface partakes to some extent of the mountainous character of the neighboring regions, the central, and especially the southeastern part around the vast delta of the Ganges and Brahmaputra, is a low plain whose character is determined by the two great water arteries of the region, and the soil is mostly alluvial. Except Egypt, there is hardly another country in the world in which the hydrographic system is such a determining factor in the agricultural and general economic conditions as it is in Bengal. This is especially true of the Ganges. After a long and swift course it is checked by the more level surface of Bengal, and the immense quantities of silt brought by the current are deposited through numerous canals upon the surrounding level country. This process of natural manuring and periodic rejuvenation of the soil results in extraordinary fertility. In the southeastern part, where the country for hundreds of miles is overflowed by the waters of the vast number of streams, streamlets, and creeks forming the complicated delta of the Ganges, numerous embankments have been erected to check excessive inundation.

Agriculture. Whether the old province be considered or the province as constituted in 1905 or in 1912, Bengal is a distinctively agricultural country. In the old province more than 56 millions, or 71 per cent of the entire population, were supported by agriculture. Of every 100 agriculturists 89 were rent-paying tenants, 9 were laborers, and 2 lived on their rents. In 1903-04 52.5 per cent of the total area was cropped, 7.2 per cent was fallow, 13.3 per cent was cultivable waste other than fallow, 24.1 per cent was not available for cultivation, and 3 per cent was forest. Food crops occupied

82 per cent of the gross cropped area, and oil-seeds 6 per cent. Of all crops rice is by far the most important, covering 71 per cent of the net cropped area. There are many varieties, each possessing special characteristics which adapt its cultivation to particular localities, but they may all be classified, according to the harvesting season, under three main heads: winter rice (the principal crop), early rice, and spring rice. Various other cereals and pulses are grown, and jute is a very valuable crop. In 1908-09 the area under leading crops was, in thousands of acres: food grains and pulses, 32,833 (including rice 22,519, maize 1815, wheat 1252, barley 1118, gram 856, millet 815, great millet 95, spoked millet 79, other 4283), oil-seeds, 1723 (including linseed 548, sesamum 207, rape and mustard 655, other 313), sugar cane, 368, other sugar, 47, condiments and spices, 83, fibres, 691 (including jute 549, cotton 67, other 76), indigo, 135, other dyes, 5, opium, 116, tea, 64, tobacco, 144, other drugs and narcotics, 2, fodder crops, 66, orchard and garden produce, 882, miscellaneous food crops, 607, miscellaneous non-food crops, 547,—total cropped area, 38,303, area cropped more than once, 5771, net area cropped, 32,532.

The manufacturing industries of Bengal have not kept pace with the agricultural development of the country. Many of the native industries, such as the manufacture of dyes and the finer silks, as well as minor articles of general consumption, have almost disappeared, and the local demand for these articles is supplied largely by British manufactures. In some of the cities there are a number of large mills equipped with modern machinery. In the rural districts, however, a large part of the population, formerly engaged in industrial pursuits, have turned their attention to agriculture. The decline of the native industries is due largely to the development of railway transportation which has enabled the machine-made goods of Great Britain to compete with the local hand-made articles.

The foreign commerce of Bengal, which is increasing, is largely with the United Kingdom. The great bulk of the trade passes through Calcutta. The imports consist mostly of cotton piece goods and cotton twist and yarn, which come almost exclusively from Great Britain, metals, mineral oil, machinery, and sugar. Of the exports, about one-fifth consists of opium and rice, and the rest of seeds, indigo, wheat, cotton, etc. Internal communication is facilitated by numerous navigable rivers as well as by roads and railway lines. Of roads, Bengal had, in 1903-04, 53,038 miles, of which only about one-eighth were macadamized. The railway system included three main lines—one leading from Calcutta toward the northwest, a second eastward, the third to Madras. In 1904 the total length of railways in the province was 4578 miles, of which 3805 miles were owned by the State, in the same year the railways in the territory which was constituted as the province in 1905 had a length of 3485 miles, of which 3041 miles were owned by the state.

Education. Instruction is provided partly by public (government and government-aided schools) and partly by private institutions. In 1908-09 the public institutions numbered 42,305, with 1,368,280 scholars (of whom only 159,562 were female), of these the primary schools numbered 37,509 (1,108,543 scholars),

secondary schools, 1545 (167,077), arts colleges, 31 (4655), professional colleges, 13 (2070), training schools, 232 (4063), and all other special schools, 2975 (81,572). In the same year there were 3148 private elementary schools, with 40,533 scholars, and 1132 private advanced schools, with 12,576 scholars. Grand total, 46,585 schools, 1,421,398 scholars. The census of 1911, out of a total population of 52,668,269 in British territory, showed 3,305,821 literate (of whom 220,311 were female) and 412,706 literate in English (29,822 female), in the native states, out of a total of 4,538,161, only 134,366 (of whom 6092 were female) were returned as literate and 5135 literate in English (178 female).

The "Bengal Army" was the term applied to the troops raised in Bengal for service with the Indian native army. The cavalry troops of the Bengal Army, and particularly the lancer regiments, are world-famous. When in 1904 under Lord Kitchener the Indian army was reconstituted, the Bengal Army was abolished, its successor is called the Eastern Command.

The Imperial revenue is derived chiefly from the opium monopoly (over 35 per cent), land rent (about 22 per cent), the salt monopoly, and customs. The Imperial expenditures amount usually to less than one-fourth of the revenue. The cost of the administration of the province is covered by the provincial and municipal taxes.

Bihar, formerly the northern part of Bengal, and anciently a powerful Sanskrit monarchy, was conquered about 1197 A.D. by the Mohammedans. So-called Mohammedan governors of Bengal ruled from 1202 till 1339, then followed independent Mohammedan kings, and from 1576 to 1765 the country was ruled by governors under the Delhi (Mogul) emperors. The first British commercial settlement was made about 1620. In 1686 the British bought, from the grandson of Aurangzeb, the site of the present Calcutta. In 1757 Clive's victory, gained against odds of 20 to 1, transferred Bengal from the Mogul's governor to the English East India Company, which was secured in its possession by the Mogul's own grant of 1765. Warren Hastings consolidated the British power in Bengal (1772-85). Under him and his successors the civil administration was thoroughly organized and important land legislation enacted. After the treaties of 1765, which placed Bengal, Bihar, and Orissa under British administration, the history of Bengal merges with that of British India.

The province of Eastern Bengal and Assam (a lieutenant governorship), which existed from Oct. 16, 1905, to April 1, 1912, had an area of 106,130 square miles, including the native states of Manipur and Hill Tippera. The population of British territory in 1911 was 34,018,527, as compared with 30,510,344 for the same territory in 1901, the increase being 11.5 per cent, native states, 575,835 in 1911 and 457,790 in 1901, the increase being 25.8 per cent. Mohammedans in British territory numbered 20,157,345 in 1911, and Hindus 12,093,940, in the native states, 79,457 and 359,480. The capital was Dacca. See ASSAM, INDIA.

BENGAL, BAY OF. A part of the Indian Ocean, of almost triangular form, projected northward between India and Farther India. It receives many large rivers—the Ganges and the Brahmaputra on the north, the Irawadi on the east, and on the west the Mahanadi, the

Godavari, the Krishna, and the Kaveri. On the western coast there is hardly anything worthy of the name of harbor, while on the east there are many good ports, such as Akyab, Cheduba, Negrais, Syriam, Martaban, Tavoy River, King's Island, besides several more in the islands between Pegu and Sumatra. The Andaman and Nicobar islands are in the eastern part of the bay. The northeastern and southwestern monsoons prevail, respectively, in summer and winter over the whole of the northern part of the Indian Ocean, which includes the bay, and also over the maritime tracts of Bengal.

BENGAL-LESE, bēn'ga-lēz'. See BENGAL. **BENGALI (bēn-ga'lē) LANGUAGE AND LITERATURE.** The Bengali language is a modern Indian dialect, akin to the Ūriya, the Assamese, the Bihari, and the Hindustani (q.v.). Like all the modern Indian languages, it is analytic in type, and the structure of its grammar thus resembles that of modern Persian or English. According to the census of 1901 Bengali is spoken by 44,624,048 souls. There are numerous dialects, but the Calcutta dialect may be regarded as the standard, although the literary language differs from any of its vernaculars, on account of the introduction of Sanskrit words, which are employed more freely in Bengali than in any other modern Indian language. The Bengali uses a peculiar but beautiful character derived from the Devanagari or Sanskrit alphabet.

The vernacular literature of Bengal is intimately connected with the religious history of that country. So intimate is the bond which links together poetry and religion, that even purely erotic literature has come to be interpreted as an allegoric exposition of religious precepts. The basis for such a view of poetry was furnished by the stories current in India about the love adventures of Krishna, and Krishna himself came to be regarded by the theological poets of India as an incarnation of the Love attribute of Vishnu. One of the earliest of these Krishnaitic poets was Chandi Das, who flourished about 1403 A.D. The poetic school headed by him was strengthened by the religious movement inaugurated by Chaitanya in the sixteenth century, which occasioned numerous theological works, many of which were, however, written in Sanskrit. Another impetus was given to Bengali literature by the translation, in the fifteenth century, of the *Mahabharata* and the *Ramayana*. In the seventeenth century a Sivaite tone was imparted to the literature. The female deities Sakti, Manasa, and Chandi share, however, in the praise of the Bengali poets. To this period belongs the poem written in the honor of Sakti by Mukunda Ram (1589). Bharata Chandra (1722-60), is another poet famous for his mastery of poetic form. His *Vidya Sundar*, an episode of an epic poem describing the conquest of Bengal by Man Singh, is one of the most popular Bengali poems. Rama Prasada Sen (1718-75), a follower of the goddess Kali, was the great religious poet of this epoch. The modern period of Bengali literature is marked by the struggle of two opposing schools, the one drawing its inspiration from the Sanskrit classics and the other working in sympathy with European ideals. Several novels have been produced under this new inspiration in Bengali, and an attempt has also been made to revive the Bengali plays, or

yatras In 1913 the Bengali poet, Rabindranath Tagore (qv), received the Nobel prize for literature

Consult Beames, *Grammar of the Bengali Language* (Oxford, 1894), Nicolls, *Manual of the Bengali Language* (London, 1894), Sen, *English-Bengalee Dictionary* (Seirampore, 1834), G C Haughton, *Bengali, Sanskrit, and English Dictionary* (London, 1833), Ganguli, *Students' Bengali-English Dictionary* (Bhawampur, 1903), Dutt, *The Literature of Bengal* (Calcutta, 1895), Grierson, *Specimens of the Bengali and Assamese Languages* (*Linguistic Survey of India*, vol v, Calcutta, 1903), D C Sen, *History of Bengali Language and Literature* (Calcutta, 1911)

BENGAL LIGHT See BLUE LIGHT

BENGAZI, bèn-gā'ze (anciently, *Berenice*). A seaport town, the capital of Barca (qv), on the coast of North Africa, finely situated on the Gulf of Sidra (Map Africa, F 1). It has a ruined castle, a pretentious bazaar, and a Franciscan monastery. Its harbor is exposed, but of considerable commercial importance. The chief exports are bailey, sponges, ivory, and ostrich feathers, although much of the commerce in the last mentioned has been diverted to Tripoli. Bengazi is the centre of a fertile region and controls an important trade with the interior by caravans. The population, estimated between 25,000 and 35,000, includes Maltese, Greeks, and Italians. Bengazi is the ancient Hesperides, which was named Berenice by Ptolemy III, in whose time it was a flourishing town. In the Turco-Italian War Bengazi was occupied by the Italians, Oct 20, 1911, and was the scene of numerous skirmishes.

BENGEL, bèn-g'el, JOHANN ALBRECHT (1687-1752). A German theologian and commentator. He was born at Winnenden, in Württemberg, June 24, 1687. After completing his theological curriculum in 1707 at Tübingen, he became curate of Metzingen, a year after he was appointed tutor in theology at Tübingen. Later in life he held several high offices, among others that of consistorial counselor and prelate of Alpnach, in Württemberg, where he died Nov 2, 1752. He was the first Protestant author who treated the exegesis of the New Testament in a thoroughly critical and judicious style. He did good service also in the identification of the text of the Bible and in paving the way for classifying the biblical manuscripts into families. The short notes in his *Gnomon Novi Testamenti* (Tübingen, 1742) have been generally regarded as valuable and translated into various languages (Eng ed., Philadelphia, 1862). They were especially made use of by John Wesley in his *Notes on the New Testament*, which forms one of the standards of Wesleyan Methodism. Indeed, Wesley's work may be regarded as little more than an abridged translation from Bengel. In *Erklärte Offenbarung Johannis* (Stuttgart, 1740), and a chronological work, the *Ordo Temporum a Principio per Periodos Economicae Divinae Historicae atque Propheticae* (Tübingen, 1741), he calculated on the basis he supposed to be laid down in the Apocalypse, that the world would endure for the space of 7777 7-0 years, and that the "breaking loose and the binding of Satan" would take place in the summer of 1836. For his biography, consult H P Burk (Stuttgart, 1831, Eng trans, London, 1837), Oscar von Wachter, *Bengel, Lebensabriss* (Stuttgart, 1865).

BENGOUGH, JOHN WILSON (1851-) A Canadian cartoonist and poet. He was born in Toronto and received a grammar-school education. In 1873 he founded *Grip*, a comic weekly, and during 10 years his generally good-natured but sometimes caustic caricatures of public men and social foibles in that paper were a feature of Canadian life. After 1892 he contributed to other Canadian publications, and during 1903 his cartoons appeared in the *London Daily Express*, *St James's Gazette*, and *Morning Chronicle*. A Liberal in politics, he often satirized the members of his own party for their faults and failures. He lectured throughout Canada, Great Britain, Australia, and New Zealand, and in many cities of the United States. In 1880, when the Royal Canadian Academy was constituted, he was appointed an associate. His verse is excellent, and some of his didactic poems have attracted attention. Among his publications are *A Concise History of Canadian Politics* (1886), *Motley Verses Grave and Gay* (1895), *In Many Keys* (1902).

BENGUELA, bèn-gā'la, or **BENGUELLA**. One of the six districts into which the Portuguese colony of Angola (qv) is divided (Map Belgian Congo, B 5). It is situated between Loanda and Mossamedes, in the most mountainous part of that colony. Minerals are found extensively. Chief towns are Lobito Bay and the capital, Benguela.

BENGUELA, or **BENGUELLA**. A seaport town, the capital of the district of the same name (Map Belgian Congo, B 5). Situated in about lat 12° 34' S, and long 13° 20' E, it lies in an exceedingly unhealthy region, near the mouth of the Kavako River, on the Baía das Vacas. It has an open roadstead, and exports rubber, ivory, wax, and skins. Tobacco, fruit, and vegetables are grown. Pop., 1911, about 3600, of which between 1000 and 1500 are whites. Benguela was founded in 1617 as San Felipe de Benguela. Before the suppression of the slave trade it had a greater population than at present, and was of considerable importance as a slave-trade centre. A railway connects it with Lobito, where there is a good natural harbor with docking facilities greatly improved in 1903.

BENGUET-IGOROT, bèn-g'et ig'ō-ōt. The pagan inhabitants of Benguet, Amburayan, and Lepanto subprovinces, and the mountains of Union Province, Luzon. They are of lower stature than the Bontoc Igorot, from whom they also differ in language and customs. They understand the working of iron, and also mine copper, which they smelt by a secret process and make into howls. See PHILIPPINES.

BENHADAD. The Hebrew translation of Bar Hadad, 'son of Hadad,' the name of two kings of Damascus. See BAR HADAD.

BENHAM, bèn-əm, ANDREW ELLICOTT KENNEDY (1832-1905). A United States naval officer. He was born in New York State and became a midshipman in 1847. He served in the East Indies until 1851, became a lieutenant in 1855, and in 1861 commanded the *Brenville*, in the South Atlantic Blockading squadron and participated in the capture of Port Royal, S C. He commanded the gunboat *Penobscot* in 1862 and served in the Western Gulf Blockading squadron until the close of the war. He served at the Brooklyn Navy Yard (1868-69), was lighthouse inspector (1870-71 and 1884-88),

and was made commodore in 1886, and rear admiral in 1890. In 1893 he won commendation by his firmness in protecting American interests at Rio de Janeiro during a revolution.

BENHAM, HENRY WASHINGTON (1816-84) An American soldier, born at Cheshire, Conn. He graduated at the United States Military Academy in 1837, was connected with various government works as a member of the Engineer Corps, and served in the Mexican War in 1847-48. From 1849 to 1852 he was superintending engineer of the sea wall for the protection of Great Brewster Island, Boston (Mass.) harbor, and from 1852 to 1853 of the Washington (D. C.) Navy Yard. In 1861 he was appointed engineer of the Department of the Ohio, in the same year was promoted to be brigadier general of volunteers, and commanded a brigade at New Creek, and from 1863 to 1865, with rank of lieutenant colonel, was in command of the engineer brigade of the Army of the Potomac. He was mustered out of the volunteer service with rank of brevet major general, U. S. V. and U. S. A. Promoted to be colonel in 1867, he was in charge of the Boston harbor sea wall from 1866 to 1873, and of the defenses of New York harbor from 1877 to 1882. He was an expert in the construction of pontoon bridges.

BENHAM, WILLIAM (1831-1910) An English clergyman and author. He was born at West Meon, Hampshire, where both his father and his grandfather had occupied the position of village postmaster. He was educated at King's College, London, and in 1864 became editorial secretary to the Society for Promoting Christian Knowledge, and professor of modern history at King's College. In 1865 he was selected by Archbishop Longley as his private secretary, and in 1872 was appointed one of the six preachers of Canterbury and vicar of Margate by Archbishop Tait. He became vicar of Maiden in 1880, rector of the Church of St. Edmund the King in 1882, and honorary canon in Canterbury Cathedral in 1888. In 1897 Bishop Creighton appointed him Boyle Lecturer. From 1903 to his death he was rural dean of East City. He was editor of Griffith and Farran's *Library of Ancient and Modern Theology* and published the following, writing for some time under the pseudonym of "Peter Lombard": *English Ballads, with Introduction and Notes* (1863), *Readings on the Life of Our Lord and His Apostles* (1880), *Companion to the Lectionary* (1872), *A New Translation of Thomas a Kempis's "Imitatio Christi"* (1874), *Memoirs of Catherine and Craufurd Tait* (1879), *A Short History of the Episcopal Church in America* (1884), *The Dictionary of Religion* (1887), *Life of Archbishop Tait*, in collaboration with the Bishop of Winchester (1891), *Medieval London* (1901), *Tower of London* (1906). Consult *Letters of "Peter Lombard,"* with a memoir by his daughter (1911).

BEN-HUR (Heb. *ben*, son + *Hur*, a proper name *Oph*, *Hur*, or *Ἰσλ*, *Hōs* in the Greek version of the Bible) The Jewish hero of a very popular novel of that name by Gen. Lew Wallace (1880), a story of Judea in the days of Christ. In dramatic form its spectacular features have made it very popular.

BENÍ, bá-né' or *bá-né* A small town on the south coast of the Dominican Republic, about 40 miles southwest of the town of Santo Domingo (Map West Indies, E 3). It dates from 1764, has a healthful climate, and is noted as being the

birthplace of several famous men, of whom was General Gomez, the so-called Liberator of Cuba.

BENÍ, bá-né One of the largest departments of Bolivia, occupying the northeastern part of the Republic, and bounded by Brazil on the north and east, by the departments of Cochabamba, La Paz, and Santa Cruz on the south, and La Paz on the west (Map Bolivia, D 6). Its area is estimated at 107,744 square miles, a large portion of which has not yet been explored. The surface is mostly flat and the soil very fertile, producing cacao, coffee, sugar cane, tobacco, tropical fruits, etc. The natural resources comprise also a heavy growth of valuable timber, including vast rubber forests, and deposits of gold. The climate is healthful, though hot and moist. Pop., mostly Indians, 1900, 32,188, 1910 (est.), 37,300. The capital and chief town of the department is Trinidad, with a population of 4810.

BENÍ A river of Bolivia, South America (Map Bolivia, D 6). It rises in the Bolivian Andes in about lat. 17° S., and flows first northwest, then north, and then northeast, and finally unites with the Mamore to form the Madeira at Villa Bella, on the northern Bolivian frontier. It is really a part of the Amazon system and drains the eastern slope of the Andes between lat. 17° S. and 12° S. It receives many tributaries from the west, the largest of which is the river Madre de Dios, but it has few tributaries from the east. It has a length of 900 miles and is navigable for half this distance, but just above its mouth it is obstructed by rapids. The river formerly received the overflow of Lake Titicaca, but the gradual desiccation of the region has put an end to this contribution to its waters.

BENICARLÓ, bá-né-kar-ló' A walled town in the province of Castellón de la Plana, Spain, at the mouth of the Benicarló River, on the Mediterranean, 42 miles northeast of Castellón de la Plana (Map Spain, F 2). It contains an old castle and a fine church, distinguished by an octagonal tower. Vine culture is a leading industry, and much of the red wine manufactured in the town and district is exported to Bordeaux. Grain, oil, vegetables, and oranges are produced, and spirits are manufactured. Pop., 1897, 7900, 1910, 7200.

BENICIA, bé-nish-i-a A city in Solano Co., Cal., 24 miles (direct) northeast of San Francisco, on the Strait of Carquinez, between Suisun and San Pablo bays, and on the Southern Pacific Railroad (Map California, C 4). It has a good harbor and boat service with San Francisco. There are tanneries, iron works, creameries, manufactories of farm implements, wagons, etc., shipyards, and fruit and fish packing houses. The city contains a United States arsenal and barracks. Benicia (named for the wife of the Mexican general, Vallejo) was founded in 1848 and until 1850 was the chief rival of San Francisco. In May, 1853, it was made "the permanent seat of government," but in March, 1854, it was supplanted by Sacramento. The city was incorporated in 1861 and is now governed by a board of five trustees, elected every four years. Pop., 1900, 2751, 1910, 2360.

BENICIA BOY A nickname popularly applied (from his residence in California) to John C. Heenan, the pugilist, whose indecisive fight with Tom Sayres, the English champion,

at Farnborough, England, in 1860, is memorable in the history of pugilism and incidentally was the cause of putting an end to bare-knuckle prize fighting in England. See BOXING.

BENI-HASSAN, bā'ne-has'san, or **HASAN** (Ar *bani*, sons, descendants, tribe + *Hassan*). A small village in central Egypt, lat 27° 53' N, long 30° 55' E, on the right bank of the Nile. The place is famous for the rock-hewn tombs, 39 in number, which are cut in the calcareous stone of the mountain, in the vicinity, and are fine examples of Egyptian architectural art. They are sepulchres of the ancient monarchs who ruled the district under the Middle Empire (about 2000 B.C.). The walls of some of the larger tombs are covered with paintings and hieroglyphic inscriptions. The former represent varied scenes of ancient Egyptian life, while the inscriptions form a most important source of information for the history of the twelfth dynasty. In recent years the mural decorations have been much injured by relic hunters. All that remains has been carefully copied, under the auspices of the Egypt Exploration Fund, and published in the *Publications of the Archaeological Survey of Egypt*, vols 1, 11, v (London, 1892, 1893, 1896).

BENI-ISRAEL, bā'ne-iz'ra-əl (Heb Sons of Israel). The name of a group of people of Jewish origin, settled in the west of India, who, while acknowledging the law of Moses, conform in many respects to the religious customs of the Hindus, by whom they are surrounded. They abstain from the flesh of unclean animals and are strict observers of the Sabbath. A few of them learned men know Hebrew, but the great majority are ignorant of the Old Testament. Their whole number is estimated at 6000. Their original settlement was at Navagaum, about 30 miles from Bombay, where they were protected by the native princes, they have spread through the maritime parts of the Konkan, and some of them are now to be found in Bombay itself. Their features exhibit a resemblance to those of the Arabian Jews. Of their early history and the time of their settlement in India little is known, though it is probable that they came to India before the Jews of Cochin. They had no doubt been for many centuries in India when about 1000 A.D. David Rahabi appeared as a reformer among them. Benjamin Tudela heard of them in the twelfth century and Marco Polo in the thirteenth. It has been said that they assumed the name Beni-Israel because that of Jehudim (Jews) was distasteful to Mohammedans, while the former name is mentioned with respect in the Koran (11, 110), but these and similar stories which make them out to be descendants of the supposed lost tribes have no historical value. Their communities are governed by a *mukaddam*, or 'head man,' of their own number, and their religious assemblies are presided over by a *cadi*, who also performs circumcision and other rites. Consult II Samuel, *Sketch of Beni Israel* (1889), and Joseph Ezekiel, in *The Jewish Encyclopedia* (1902).

BENI-ISRAEL. A diminutive antelope (*Neotragus saltianus*), allied to the duikerboks, and common in Abyssinia and along the Red Sea. It is variously called *omidigig*, *madoqua*, *hegoleh*, and *Salt's antelope*. In southern Abyssinia (Somaliland) a closely related species, Kirk's antelope (*Neotragus kirkii*), is ex-

ceedingly numerous. They run by long bounds, utter shrill cries, and their flesh has an unpleasant, musky flavor.

BENIN, ben'en' (from Lat *benignus*, kind, good, benign). A country, river, and city in the British colony and protectorate of Southern Nigeria (Map Africa, E 4). The country, formerly ruled by the King of Benin City, is in the Central Province between Lagos and the Niger River. At one time the city, which now has about 10,000 inhabitants, was the capital of a powerful monarchy, notorious for human sacrifices carried out by fetishistic priests. The area of the kingdom was extensive, and formerly the name "Benin" was applied to the stretch of country between the Volta River and the Rio del Rey, which includes the Slave Coast, the great Niger delta, and some territory to the eastward. The shores of this country are swampy and unhealthy. The interior is well wooded. In the Benin of to-day the soil is fertile and yields rice, yams, and other products characteristic of upper Guinea. Since the suppression of the slave trade the principal export is palm oil. The inhabitants are little advanced beyond the savage state, and the sacrifice of human beings as a religious custom has been of frequent occurrence. Benin is supposed to have been discovered by the Portuguese navigator, Diogo Cam, in 1482. Benin became the centre of the slave trade, which was suppressed by the British. Benin was placed under British protection in 1885, but for a long time the authority of the British was merely nominal. At the beginning of 1897 the British acting consul general and several Europeans who were traveling to Benin on a peace mission were massacred, with the result that a punitive expedition captured the city in February. The city and country were incorporated in the Niger Coast Protectorate, now included in Southern Nigeria. Government is administered by a council of chiefs presided over by a British resident. Consult Roth, *Notes on Benin Customs* (Leyden, 1898), "Primitive Art from Benin," in No. 15 *The Studio* (London, 1898), Roth, *Great Benin* (Halifax, 1903).

BENIN, BIGHT OF. A name applied to that portion of the Gulf of Guinea (q.v.) which extends along the so-called Slave Coast of Africa, from Cape Formosa, the chief mouth of the Niger, westward to Cape St. Paul, a distance of 500 miles by coast line. The Forcados River emptying into the Bight is the main water route between the ocean and the Niger above the Delta.

BENIOWSKY, bēn'yōf-skē, COUNT MORITZ AUGUST VON (1741-86). A Hungarian adventurer, born at Verbó. He served in the Austrian army during the Seven Years' War, joined the Polish Confederation, was captured by the Russians, and was exiled to Kamchatka, whence he escaped to France. Sent by the French government to establish a colony in Madagascar, he caused himself to be proclaimed King in 1776 by several native tribes, and was subsequently killed in a battle with troops sent against him by the Governor of the Ile de France. His *Memoirs and Travels*, edited by Nicholson and Magellan, appeared at London in 1790.

BENI-SUEF, bā'nē-swe'f. A town of central Egypt, capital of the province of Beni-Suef (area, 400 square miles, pop, 1907, 372,500).

It is situated on the right bank of the Nile, 62 miles by rail south of Cairo (Map Egypt, C 2). It is the entrepôt of all the produce of the fertile valley of Fawm and has cotton mills operated by the state. Pop, 1897, 18,220, 1907, 23,357.

BENITIER, ba'ne'tyá' See HOLY-WATER VASE.

BENITOITE, be-nít'o-ít (from San Benito Co, Cal.) A gem mineral of a deep purple-blue color which often surpasses sapphire in fire and brilliancy. It is a titano-silicate of barium occurring in hexagonal crystals which establish a new crystallographic group. Benitoite was discovered in 1907 in San Benito Co, Cal.

BENJAMIN The eponymous ancestor of the tribe of Benjamin. According to Gen xxxv 18, he is the younger son of Jacob and Rachel, named by his mother Benoni ('child of my sorrow'), but renamed Benjamin by his father. The second element of the name is parallel with the Arabic term Yemen, 'right,' 'south,' (southern Arabia), as opposed to Shamal, 'left-north,' and therefore some biblical scholars consider it probable that Benjamin was originally a geographical name for a group settled in the southern portion of the Ephraimic highland (Sam ix 10-16). The stories told of Benjamin in Genesis seem to illustrate the predictions of both Judah and Ephraimic writers for this tribe. After Joseph was sold into Egypt Benjamin was the pet of his father, and Jacob could only with difficulty be persuaded to allow him to accompany his brothers into Egypt during the famine (ib xlii 36, xlii 6-14). At the time of the migration of Jacob to Egypt Benjamin appears as the head of a family of 10 (ib xlii 21), and is already depicted as the ancestor of the tribe of Benjamin. The territory of this tribe in Palestine was between Judah and Ephraim and included among its important cities Jericho, Bethel, Ophrah, Gibeon, and Ramah, all of which were also important sanctuaries (Josh xviii 11, 21-25). Jerusalem seems to have been on the border between Judah and Benjamin. The tribe was one of the most warlike of the whole 12 and, considering that it was a small tribe, played a most important part in Hebrew history. It produced such men as Ehud the Judge (Judges in 15 ff) and King Saul (1 Sam ix 1-2). After Saul's death it joined in the revolt of his son Ishbosheth (2 Sam ii 15), and Sheba, the Benjamite, later led a revolt against David (2 Sam xx 1). The strength of the tribe in war proves that its almost total destruction by the rest of Israel for its conduct in connection with the outrage at Gibeon (Judges xix-xxi) had no permanent effect, and the account of their destruction is exaggerated. When the kingdom was divided, Benjamin joined with Judah in forming the southern kingdom, or Kingdom of Judah (1 Kings vii 21, etc.). Some scholars regard the tribe of Benjamin as having originally, with Ephraim and Manasseh, formed the tribe of Joseph (cf 2 Sam xix 16, with ib xix 20, and note the expression, "house of Joseph," in 1 Kings xi 28), and according to the view that the stories in Genesis are the echoes of tribal history, this explains the fact that Benjamin is there spoken of as the full brother of Joseph, as it also accounts for the favorable opinion of Benjamin held in general by northern writers, despite the fact that it joined

Judah in establishing the southern kingdom. For the history of the southern kingdom, composed of Judah and Benjamin, see JEWS. Esther and Mardochei (Esther ii 5, 7) and the Apostle Paul (Rom i 11, Phil iii 5) belonged to this tribe.

BENJAMIN OF TUDELA, tū dā'la (Benjamin ben Jonah). A Jewish traveler. He was born at Tudela in Navarre, Spain. He was the first European who gave information respecting the distant East. He made a journey from about 1160 to 1173 (in which year he died) from Saragossa, through southern France, Italy, and Greece, to Palestine, Persia, and the borders of China, returning by way of Khuzistan, the Indian Ocean, and Yemen to Egypt, Sicily, and Spain. His notes—translated into Latin, English, German, Dutch, and French—are exceedingly valuable, but, like so many early travelers, he readily accepted miraculous stories which were told him, and his accounts are not always trustworthy. The latest edition, by Asher (London and Berlin, 1840-41), contains the original text, with an English translation and annotations. He took notes during his travels, and these were published with a preface by an unknown author under the title *Mas'oth shel Rabbi Benjamin* ('Travels of Rabbi Benjamin'). The Hebrew text was printed at Constantinople in 1543, and often since, the latest edition being that of Grunhut published in Jerusalem, 1903. It was translated into Latin by Arias Montanus in 1575, and subsequently into Dutch, German, and French. Asher published the Hebrew text with an English translation in London, 1840, and M N Adler a part of it in the *Quarterly Statement of the Palestine Exploration Fund*, October, 1894 from a manuscript in the British Museum. Consult E Carmoly and L Lekwel, *Notice Historique sur Benjamin de Tudela* (1852).

BENJAMIN, ASHER An early American architect of the end of the eighteenth century, and the author of the earliest American books on architecture and building—*The Elements of Architecture, Town and Country Builder's Assistant* (1797), and *The Practical House Carpenter*. He practiced chiefly in Massachusetts.

BENJAMIN, CHARLES HENRY (1856-) An American mechanical engineer, born at Patten, Me. He graduated from the University of Maine with the degree of M E in 1881, and as instructor, and later professor, of mechanical engineering, taught at his alma mater from 1880 to 1886. After three years as mechanical engineer for the McKay Machine Company of Boston, he resumed educational work, accepting (1889) the professorship of mechanical engineering at the Case School of Applied Science. In 1907 he was called to Purdue to become dean of the engineering school in that university. In addition to articles in technical journals and monographs on engineering subjects, he published *Modern American Machine Tools* (1906), *Steam Engine* (1909), *Machine Design*, with J D Hoffman (1913).

BENJAMIN, JUDAH PHILIP (1811-84) An American lawyer and statesman, one of the leaders of the Southern Confederacy, during the Civil War. He was born of English-Jewish parentage, in the island of St Croix, West Indies, removed with his parents to Wilmington, N C, in 1815, studied for three years at Yale, and in 1832 was admitted to the bar in New Orleans, where two years later he pub-

lished a valuable work, entitled *Digest of Reported Decisions of the Supreme Court of the Late Territory of Orleans and of the Supreme Court of Louisiana*. He soon acquired an extensive practice, became a member of the law firm of Shidell, Benjamin, and Conrad in 1840, made a celebrated argument in connection with the "Creole Case" (qv) in 1841, and in 1847 was retained as counsel by the United States commission appointed to adjudicate the Spanish land titles in California. In 1848 he was admitted to practice before the Supreme Court and subsequently spent much of his time in Washington. He was United States Senator from Louisiana from 1852 to 1861. In February, 1861, he withdrew from the Senate and soon afterward was appointed Attorney-General in President Davis's provisional cabinet. On the resignation of L. Pope Walker, in August, he became Secretary of War, but soon resigned, owing to congressional charges of incompetence and negligence, and in February, 1862, accepted the position of Secretary of State. In this capacity he served with remarkable energy and efficiency until the close of the war. Upon the surrender of Lee at Appomattox, Benjamin fled from Richmond, and after undergoing many hardships finally reached England in September, 1865. He then entered as a student at Lincoln's Inn, London, was called to the English bar in June, 1866, and in 1868 published *A Treatise on the Law of Sale of Personal Property* (3d ed., 1883), which came to be regarded as a legal classic in England. Benjamin gradually acquired an enormous practice, at first in *mis prius* cases, and afterward in cases of appeal before the Privy Council and the House of Lords, but in 1883 he was forced by failing health to retire from the bar. Consult Pierce Butler, *Judah P. Benjamin* (Philadelphia, 1907).

BENJAMIN, LEWIS S., pen name, LEWIS MELVILLE (1874-) An English author, born in London and educated privately in England and Germany. From 1896 to 1901 he was chiefly known as an actor, though part of his time even then was devoted to literature. Several biographies and descriptions of English social life at important periods were written by him, his publications including *In the World of Mimes* (A Theatrical Novel) (1902), *The Thackeray Country* (1905), *Victorian Novelists* (1906), *Bath under Beau Nash* (1907), *The Beau of the Regency* (1908), *William Makepeace Thackeray: A Biography* (1909), *The Life and Letters of Laurence Sterne* (2 vols., 1911, Am ed., 1912), *The Life and Letters of William Cobbett* (2 vols., 1912, Am ed., 1913). He also edited Thackeray's works (20 vols., 1901-07).

BENJAMIN, PARK (1809-64) An American journalist and poet. He was born in British Guiana, Aug. 14, 1809, but was early sent to New England, and graduated from Trinity College, Hartford, Conn. He practiced law in Boston, but abandoned it for editorial work there and later in New York. In 1840 he helped to found *The New World* and after other brief editorial ventures became a lecturer, public reader, and periodical writer. He is now known only through his shorter poems, of which "The Old Sexton" is a favorite of the anthologist.

BENJAMIN, PARK (1849-) An American patent lawyer and writer. He was born in New York City, graduated at the United States

Naval Academy in 1867, resigned from the navy in 1869, and graduated at the Albany Law School in the following year. He was associate editor of *The Scientific American* from 1872 to 1878 and subsequently edited Appleton's *Cyclopadia of Applied Mechanics and Cyclopadia of Modern Mechanism*. Besides numerous magazine articles dealing for the most part with scientific subjects, he published *Shakings or Etchings from the United States Naval Academy* (1867), *Wrinkles and Recipes* (1875), *The End of New York* (1881), *The Age of Electricity* (1886), *The Voltaic Cell* (1892), *The History of Electricity* (1895), *A History of the United States Naval Academy* (1900), *Modern Mechanism* (1903).

BENJAMIN, SAMUEL GREEN WHEELER (1837-) An American author and artist. He was born at Aigos, Greece, studied at the English College in Smyrna, and in 1859 graduated at Williams College. He was assistant librarian in the New York State Library in 1861-64, served in hospitals, studied law, and for several years art, and was United States Minister to Persia in 1883-85. He contributed frequently to periodical literature, and was editor of the *American Magazine of Art*, an admirable periodical. He wrote *Art in America* (1879), *Troy Its Legend, Literature, and Topography* (1881), *A Group of Etchers* (1883), *Persia and the Persians* (1886), *Sea Spray* (1888). He became known also as an illustrator and marine painter.

BENJAMIN - CONSTANT, bən'zhā'mān' kōn'stān', JEAN JOSEPH. See CONSTANT.

BEN'KELMAN. A village and the county seat of Dundee Co., Neb., 337 miles west by south of Lincoln, on the Republican River, and on the Chicago, Burlington, and Quincy Railroad (Map Nebraska, C 4). Agriculture and stock raising are the principal industries. The water works and electric light plant are owned by the village. Pop., 1900, 357, 1900, 206.

BENKERT, bēn'kērt, KARL MARIA. See KERTENY, KARL MARIA.

BENKULEN, or **BENCOOLEN** (Dutch, *Benkoelen*), bēn-kō'len. A picturesque little town, and the capital of the residency of the same name, on the western coast of Sumatra, situated in lat. 3° 48' S and long. 102° 16' E (Map East Indies, B 5). During the occupation of the British, by whom it was founded in 1685, it rose to some eminence as a centre for trade and coffee growing. It was ceded to the Dutch in 1825 and has since then gradually lost its commercial importance. Pop., estimated to be 12,000.

BEN LEDI. A mountain of Perthshire, Scotland, 4 miles west-northwest of Callander, with an elevation of 2875 feet (Map Scotland, D 3). It received its name from the Druids, who celebrated the Beltane mysteries on its summit—the Gaelic words *Benn le Dia* signifying "hill of God." This mountain is celebrated in Scott's *Lady of the Lake*.

BEN LOMOND (Gael. *ben*, mountain + *lake Lomond*). A mountain in the northwest of Shirlingshire, Scotland, on the east side of Loch Lomond, 27 miles west-northwest of Stirling (Map Scotland, D 3). It forms the southern extremity of the Grampians or Central Scottish Highlands, is 3192 feet high, and consists of mica slate, with veins of quartz, greenstone, and feldspar porphyry. From the summit a sheer precipice of 2000 feet descends on

the north side, and a gentle declivity on the southeast, it is covered with vegetation almost to the top and is much frequented by tourists. It is the source of Duchray Water, one of the feeders of the Forth.

BEN MACDHUI, māk-dōv'ē (Gael *Beinn-na-mac-dubh*, the mountain of the black sow.) A mountain on the border of southwestern Aberdeenshire and Banffshire, Scotland, one of the Cairngorms, and, after Ben Nevis, the loftiest in the country (Map Scotland, E 2) Height, 4296 feet.

BEN'MORE' HEAD See FAIR HEAD.

BENN'DORF, OTTO (1838-1907) A German archaeologist. He was born at Greiz, studied philology at Erlangen and Bonn (1857-62), and traveled in Italy and Greece (1864-68), largely for the German Archaeological Institute. He occupied the chair of archaeology at Göttingen (1868), Zurich, Munich, Prague, and Vienna, where he became director of the Archaeological Institute in 1898. He was a member of the archaeological expeditions to Samothrace (1875) and of that to Asia Minor (1881-82). Among his numerous works are the following: *Die antiken Bildwerke des lateinischen Museums*, in collaboration with R. Schöne (1867), *Antike Gesichtshelme und Sepulchralmasken* (1878), *Reisen im südöstlichen Kleinasien* (1884), *Reisen in Lykien und Karien* (1884).

BEN'NET, HENRY, EARL OF ARLINGTON See ARLINGTON.

BEN'NETT, ALFRED ALLEN (1850-) An American chemist, born at Milford, N. H. He graduated at the University of Michigan in 1877, and took the degrees B.Sc. and M.Sc. at the same institution 10 years later. He was for a time professor of chemistry and physics at Iowa Wesleyan University and the University of Chicago. In 1885 he was appointed professor of chemistry in the Iowa State College. He wrote *Inorganic Chemistry* (2 vols., 1895) and several articles for scientific publications.

BENNETT, ALFRED WILLIAM (1833-1902) An English botanist, born at Clapham. He studied at University College, London, and was appointed examiner in botany to the University of Wales. Subsequently he became lecturer on botany at St. Thomas's Hospital, London. He was at one time vice president of the Linnæan Society. His publications include a *Handbook of Cryptogamic Botany*, with G. Murray (1880) and *Flora of the Alps* (1896). He also translated several works from the German, including the third edition of Julius Sachs's *Lehrbuch der Botanik* (1875).

BENNETT (ENOCH) ARNOLD (1867-) An English writer who stands in the front rank of contemporary novelists. Born at Hanley-in-the-Potteries (one of the "Five Towns" made famous by his pen), and educated at Newcastle Middle School and at the University of London, he was early a clerk in lawyers' offices, later editor of a woman's magazine, and finally in 1900 gave himself entirely to literary work. The best of his miscellaneous writing is included in *The Truth about an Author* (1903), *How to Live on Twenty-four Hours a Day* (1908), and *Literary Taste and How to Form It* (1909). Of his plays, two were performed in New York with success—*Milestones* in 1912, and *The Great Adventure* (a dramatization of his novel, *Buried Alive*) in 1913. Mr. Bennett's claim to distinction, however, rests upon a

group of the novels produced by him: *Anna of the Five Towns* (1902), *The Old Wives' Tale* (1906), *Clayhanger* (1910), *Hilda Lessways* (1911), *The Matador of the Five Towns* (1912)—these are unromantic studies of commonplace people in the commonplace setting of a string of dingy manufacturing towns, but their psychological insight, their fine workmanship, their impassive, long-drawn, and minute realism place them among the most notable English novels of their times. Other works are: *A Man from the North* (1898), *A Great Man* (1904), *Sacred and Profane Love* (1905), *Whom God Hath Joined* (1906), *The Reasonable Life* (essays, 1907), *The Grim Smile of the Five Towns* (1907), *The Card* (1911), plays—*Cupid and Common Sense* (1908), *What the Public Wants* (1909), and *The Honeymoon* (1911). An idea of Mr. Bennett's facility in writing may be gained from the fact that in 1913 he published four books—*The Old Adam*, considered one of the notable novels of the year, *Your United States*, one result of an "impressionistic" tour of America, *Paris Nights*, more impressions, and *The Plain Man and His Wife*, an amplified essay.

BENNETT, CHARLES EDWIN (1858-) An American classical scholar, born in Providence, R. I. He graduated at Brown in 1878, studied at Harvard (1881-82) and in Germany (1882-84), was professor of Latin at the University of Wisconsin in 1880-91, of classical philology at Brown, 1891-92, and of Latin at Cornell after 1892. He wrote *A Latin Grammar and Appendix* (1895), *Latin Composition* (1896), *Foundations of Latin* (1898), *Latin Lessons* (1901), *Preparatory Latin Writer* (1905), and edited *Cæsar's Gallic Wars, books i-v* (1903), *Cicero's Selected Orations* (1904), *Vergil's Æneid, i-vi*, *Cicero's De Amicitia and De Senectute*. The *Appendix* to his *Latin Grammar* he revised, in 1907, under the title of *The Latin Language*. The *Latin Grammar* itself is noteworthy for its brevity and clearness, it was the first brief Latin Grammar in the United States made independently, that is, not as an abbreviation of a larger grammar. Professor Bennett's best work has been done in the field of syntax. In 1910 he published, under the title *Syntax of Early Latin*, vol. i—*The Verb*, the first half of a monumental work on the syntax of Latin down to 100 B.C. His "Critique of Recent Subjective Theories," in *Cornell Studies in Classical Philology*, vol. ix (1898), is also of great value. He contributed to various philosophical journals.

BENNETT, CHARLES WESLEY (1828-91) An American scholar and educator, born at East Bethany, N. Y. He graduated in 1852 at Wesleyan University and in 1856 became principal of the Genesee Wesleyan Seminary at Lima, N. Y. In 1860 he was appointed superintendent of public schools in Schenectady, N. Y., and in 1861 became principal of the Louisville (N. Y.) Academy. He was ordained to the ministry of the Methodist Episcopal church in 1862. From 1866 to 1869 he traveled and studied at the University of Berlin and in 1871 was called to the chair of history and logic in Syracuse University. From 1885 until his death he was professor of historical theology in the Garrett Biblical Institute, Evanston, Ill. He published a *Digest of the Laws and Resolutions of Congress Relative to Pensions, Bounty-Lands, etc.* (1854), a *History of the Philosophy of Ped-*

gogics (1877), *National Education in Italy, France, Germany, etc* (1878), and *Christian Archaeology* (1888)

BENNETT, EDWARD HALLARAN (1837-1907) An Irish surgeon, born in Cork. He graduated at Trinity College, Dublin, and was appointed professor of surgery in the University of Dublin in 1873. In 1897-1900 he was president of the Royal Academy of Medicine in Ireland. Becoming an authority on bone fractures he described, in 1881, a form of fracture of the metacarpal bone of the thumb that has since been known by his name. He published *Ankylosis of the Hip* (1874), *Fractures of the Rib* (1878), and other surgical works.

BENNETT, JAMES GORDON (1795-1872) An American journalist, born at Newmills, Banffshire, Scotland. He studied for the Roman Catholic priesthood at the seminary of Aberdeen and in 1819 emigrated to Halifax, N. S. Thence, after a brief and highly unsuccessful career as an instructor in bookkeeping, he proceeded to Boston, where he became a proof reader in the establishment of Wells & Lely, then publishers of the *North American Review*. In 1822 he was appointed Spanish translator and general assistant in the office of the Charleston (S. C.) *Courier*. Subsequently he appears as a paragraphist in New York and in 1827-32 as Washington correspondent of the *Enquirer*. For 30 days, in 1832, he published the *Globe*, and in 1833-34 was part owner and principal editor of the Philadelphia *Pennsylvanian*. Through both journals he was a vigorous partisan of Jackson and Van Buren, by whom he was totally and irritatingly ignored. On May 6, 1835, from a cellar at No. 20 Wall Street, he issued the first number of the *New York Herald*—a lively little sheet of four four-column pages. On June 13 he included in the *Herald* the first Wall Street financial article printed in any newspaper in the United States, and in December introduced modern American reportorial methods by his graphic accounts of the great fire, to which were added a picture of the burning Exchange and a map of the devastated district. He obtained the transmission by telegraph of the first speech ever thus reported in full—that of Calhoun on the Mexican War. He wrote trenchant, often cynical editorials, which made enemies for the writer, but increased the circulation of his paper. But his chief aim was the collection and dissemination of contemporaneous intelligence, in illustration of which may be cited the fact that during the Civil War he maintained an extra staff of 63 correspondents at an expense for four years of \$525,000. He continually added new specialties to his newspaper until he had originated practically all the features now common to modern journalism. In doing so he made the *Herald* at the time of his death the most important and the most valuable newspaper property in the United States, with yearly profits not far from \$750,000. He was frequently accused of utter lack of conviction. James Parton wrote, in 1867, that "his paper is generally read and its proprietor universally disapproved." It may at least be said that his civic principle was not lofty, who declared "We have never been in a minority, and we never shall be." Consult Parton, *Famous Americans of Recent Times* (Boston, 1867); Frederic Hudson, *Journalism in the United States from 1890-1872* (New York, 1873).

BENNETT, JAMES GORDON (1841-)

An American newspaper proprietor and yachtsman, son of the preceding. He was born in New York and was educated abroad privately. On his father's death in 1872 he assumed control of the *New York Herald*, and thereafter he directed the policy of the paper largely by cable, early taking up his residence in Paris. For a time he published a London edition, the practice of reporting in England storm warnings transmitted from the United States being begun by him, he also instituted the *Herald's* Paris edition. Mr. Bennett displayed much interest in exploration, at his own expense sending out Henry M. Stanley to Africa to find Livingstone (1874-77), and in 1879 equipping the *Jeannette* Polar Expedition. With John W. Mackay he established the Commercial Cable Company. His sustained interest in yachting dates back half a century, when 25 years old he won a yacht race from Sandy Hook to the Isle of Wight with his schooner *Henrietta*.

BENNETT, JOHN HUGHES (1812-75) An English physician and physiologist. He was born in London, and entered the University of Edinburgh in 1833, where J. H. Balfour, Edward Forbes, and John Reid were among his fellow students. After his graduation, in 1837, he studied two years in Paris, where he founded the Parisian Medical Society and became its first president. On his return to Edinburgh in 1841 he published his famous *Treatise on Cod-Liver Oil as a Therapeutic Agent in Certain Forms of Gout, Rheumatism, and Scrofula*. It was not until the publication of this pamphlet and that of Dr. C. B. Williams (1848), that the oil was generally introduced. As lecturer on histology at Edinburgh Dr. Bennett was the first to give systematic instruction in this subject. He was also one of the pioneers in the employment of the microscope in clinical pathology. In 1843 he was chosen professor at the Institute of Medicine in Edinburgh, and he held this position until his resignation in 1874. The remarkable decrease in the mortality of pneumonia was also due to his efforts and was largely the result of his revelation of the dangers attending the so-called antiphlogistic method of treating this disease. He published in all 105 papers and memoirs, most of them of great importance. Especially celebrated among his larger works are the *Clinical Lectures on the Principles and Practice of Medicine* (1850-56). Six editions of this work were, prior to 1875, published in the United States alone, and translations of it have been made in French, Russian, and Hindu.

BENNETT, WILLIAM COX (1820-95) An English poet. He was born at Greenwich, where he continued the business of his father, who was a watchmaker. His first productions were published anonymously in 1843 and 1845. They were followed by *Poems* (1850), *Vociferals* (1852), *War Songs* (1855), *Queen Elcanor's Vengeance, and Other Poems* (1850), *Baby Mity* (1859), *Songs for Sailors* (1872), *Sea Songs* (1878), *Songs for Soldiers* (1870), *Prometheus the Fire-Giver* (1877), *The Lark, Songs, Ballads, and Recitations for the People* (1885).

BENNETT, SIR WILLIAM STERNDALE (1816-75) An eminent English pianist and composer, born at Sheffield. He studied under Holmes, Potter, and Crotch in the Royal Academy, London, attracted the notice of Mendelssohn at the Dusseldorf Musical Festival in 1836, appeared with success at Leipzig in the

winters of 1837-38 and 1838-39, and was received with great applause when he returned to London. In 1838 he was elected member of the Royal Society of Musicians. He visited Germany again in 1842 and became well acquainted with both Mendelssohn and Schumann. He had a prominent share in the foundation of the Bach Society in 1849, was appointed conductor of the Philharmonic Society in 1855, succeeding Richard Wagner, and in the following year was elected professor of music at Cambridge. In 1868 he was appointed principal of the Royal Academy of Music and was knighted in 1871. He stood foremost among contemporaneous English musicians, was a pianist of the first rank, and a composer of exquisite grace and refinement. His principal works are *The May Queen*, a cantata, the overtures *The Naiads*, *Wood Nymphs*, *Parisina*, and *Paradise and the Peri*, the oratorio, *The Woman of Sumatra*, music to the *Ayas* of Sophocles, four concertos for pianoforte, and a symphony. Consult V J Bennett, *The Life of William Sterndale Bennett* (London, 1907).

BENNETTIALES, bĕn'ĕt-jā'lĕz. An extinct order of Gymnosperms very abundant during the Mesozoic. They were long known as 'fossil Cycads,' but recent investigations have shown that they deserve to be recognized as a distinct order. Their remains have been found in western Europe and in India, but by far the richest display has been found in the United States and Mexico. The three prominent localities in the United States that have yielded material are in Maryland, in the Black Hills of South Dakota, and Wyoming, and in the Freezeout Hills of Wyoming, while the Mexican locality is in the mountains of western Oaxaca. These American forms have been investigated chiefly by Dr G R Wieland. These gymnosperms mostly resembled the Cycads in appearance, the trunks being tuberous or columnar and bearing a crown of large fern-like leaves. Perhaps the most striking feature of the group is that the cones, which were borne upon short branches along the trunk, were "bisporangiate," i.e., included both "stamens" and "carpels." In the other orders of Gymnosperms there are two kinds of cones—one made up of the stamens, and the others made up of the carpels. See Plate of GYMNOSPERMS.

BENNETT'S GAZELLE, ga-zĕl'. See GAZELLE.

BEN'NETTSVILLE. A town and the county seat of Maïlboac Co, S C, 106 miles northeast of Columbia, the State capital, on the Atlantic coast line and the Bennettsville and Cheraw railroads (Map South Carolina, F 2). The town contains a sanitarium and a public library, and owns its water works and electric light plant. It is in a highly fertile cotton and corn belt and has manufactures of cotton goods and fertilizers. Pop, 1890, 978, 1900, 1920, 1910, 2646.

BEN NEVIS (Gael probably *bēn*, mountain + *nevis*, snow, Lat *nix*, gen *nivis*, snow, of Sp *Sierra Nevada*, snowy range, and Eng *Knawdon* = snow + down). The highest mountain in Great Britain, in Inverness-shire, Scotland (Map Scotland, D 3). It has a height of 4406 feet, with a precipice of 1500 feet on the northeast side. Granite and gneiss form the base of the mountain, which exceeds 24 miles in circumference, the upper part is composed of porphyry. A road leads to the summit, where

a meteorological observatory was erected in 1883.

BENNEWITZ, bĕn'ne-vits, or **BIENEWITZ**, PETER. See APIANUS, PETRUS.

BENNIGSEN, bĕn'nik sĕn, LEVIN AUGUST THEOPHILUS, COUNT (1745-1826). A Russian general. He was born in Bunswick, entered the Russian service in 1773, and distinguished himself in the wars against the Turks, in Poland, and at Derbend in Persia. Bennigsen was one of the leaders of the conspiracy against the Emperor Paul (1801). He fought with considerable success in the battle of Pultusk (1806) and held the chief command in the obstinate and murderous struggle at Eylau (1807). In 1812 Bennigsen commanded the Russian centre at Borodino and gave his voice for fighting a second battle before the walls of Moscow. Before the French began their retreat he gained a brilliant victory over Murat at Taratino, October 18. Differences with Kutusoff, who would not adopt Bennigsen's plan to prevent the French from crossing the Beresina, made him retire from the army, but after Kutusoff's death he took the command of the Russian army of reserve, which entered Saxony in July, 1813, and fought victoriously at the battle of Leipzig. He was created a count by Emperor Alexander on the field. He participated in the pursuit of the French army and besieged Hamburg. Failing health made him retire from the Russian service in 1818 to his paternal estate in Hanover.

BENNIGSEN, RUDOLF VON (1824-1902). A German statesman. He was born at Luneburg, Hanover, and at an early age became prominent and influential in the political life of his native land. After the annexation of Hanover to Prussia in 1866, he was elected to the North German Diet and the Prussian Assembly and became vice president of both bodies. In 1871 he was elected to the German Reichstag, where he became leader of the National Liberal Party. He was conspicuous in the Prussian Assembly, over which he presided from 1873 to 1879. He was for years a warm supporter of Bismarck, but after 1878 opposed the laws against the Socialists and equally the economic policy of the government. After the more liberal wing of the National Liberals seceded (1880), Bennigsen continued to lead the party on a more conservative basis. He resigned his mandate in the Prussian Assembly and the Reichstag in 1883, but reentered politics in 1887, and once more became the leader of the National Liberal Party, thenceforth generally in accord with the government. He became president of the province of Hanover in 1888, but resigned his position in 1897. Consult Hermann Oncker, *Bennigsen und die Epochen des parlamentarischen Liberalismus in Deutschland und Preussen* (Munich, 1900).

BEN'NINGTON. A township with three incorporated villages, and the county seat of Bennington Co, Vt, 52 miles (direct) south by west of Rutland, on the New York Central Railroad (Map Vermont, A 8). It is noted as a manufacturing centre, producing extensively knit goods, woollens, hosiery, machinery, needles, paper, scales, shirts, collars, cuffs, etc. Bennington is the seat of a State Soldiers' Home and owns its water works. The town, through its selectmen, has complete control of the more important matters, but each village manages its own local affairs and controls its public utilities. The town was settled in 1761, and named in honor of Governor Benning Wentworth of

New Hampshire Vermont was for many years—before its recognition as a State—claimed both by New York and New Hampshire, and a council of safety, organized at first chiefly by citizens of Bennington, was largely instrumental in making it a separate State. It was the home of Seth Warner and Ethan Allen and on Aug 16, 1777, was the scene of the Battle of Bennington (qv). A battle monument over 300 feet high, commemorative of this event, has been erected in Bennington Centre. Pop., 1890, 3971, 1900, 5656, 1910, 8698. Consult Merrill and Merrill, *Sketches of Historic Bennington* (Cambridge, 1898).

BENNINGTON, BATTLE OF A battle fought on Aug 16, 1777, during the American Revolution, between a force of Hessians, British Loyalists, and Indians, under Colonel Baum, and a superior force of New Hampshire militia, under General Stark. On the 13th Burgoyne had sent Baum with a detachment of 700 (including 150 Indians) to capture the depot of supplies at Bennington, and on the 15th had sent Colonel Breyman with a reinforcement of 640 Hessians. Baum was attacked at 3 P.M. on the 16th by Stark, at the head of about 2000 militia, and before the arrival of Breyman nearly his whole force had been killed, wounded, or captured, he himself being mortally wounded early in the engagement. Stark, reinforced by 500 men under Seth Warner (qv), then turned upon Breyman, and by nightfall had almost annihilated his army. The British loss is estimated at 207 killed and 700 captured (including the wounded), the American at 40 killed and 42 wounded. The victory greatly weakened Burgoyne by withdrawing almost a seventh of his effective force and by causing the desertion of a large body of Indians and Canadians, while it greatly strengthened the Americans, particularly by causing the enlistment of large bodies of militia for service under General Gates. (See SARATOGA, BATTLES OF). Consult Tyler, *Bennington, the Battle of* (Worcester, 1878), and Carrington, *Battles of the American Revolution* (New York, 1877).

BENNO, SAINT (1010-1106) Bishop of Meissen. He was a son of the Count of Woldenberg and became Bishop of Meissen in 1066. His vacillating policy during the conflict between the Emperor Henry VI and Pope Gregory VII led to his frequent imprisonment. He was deposed in 1085 by the Synod at Mainz, but was reinstated two years afterward through the mediation of Pope Clement III and thenceforth devoted himself solely to his clerical duties and to the conversion of the Wends. He was placed among the saints by Pope Adrian VI in 1523. Luther attacked him in the writing entitled *Wider den neuen Abgott und alten Teufel der zu Messen soll erhoben werden*, and at the beginning of the Reformation his body was disinterred, but finally found a resting place at Munich in 1576, which city had chosen Benno as its patron saint. Consult Joannes Kirsch, *Beilage zur Geschichte der heilige Benno* (Munich, 1911).

BENOIT, be-nwa', PIERRE LÉONARD LEOPOLD (1834-1901) A Flemish composer. He was born at Harlebeke, Belgium, and studied with Fétis at the Brussels Conservatory (1851-55), and afterward at Leipzig, Dresden, Munich, and Berlin. In 1862 he conducted the orchestra at the Bouffes Parisiens, Paris, and in 1867 he received an appointment as director of the Conservatory at Antwerp. He was the most active promoter of a strictly national school of music

for Belgium. His important compositions include *Het Doorp in't Gebergte*, comic opera (1856), the operas *Isa* (1867), *Pompeja* (1896), the oratorios *Lucifer*, *The Scheldt*, *Drama Christi*, *Childien's Oorlog*, *The Rhine*, incidental music to Vander Ven's *Charlotte Corday*, and Goethem's *Vallem de Zwyer* (William the Silent), the cantatas *De Oorlog* (War), and *Vlaanderen's Kunstboom*, a *Missa Solemnis*, a *Te Deum*, a *Requiem*, a choral symphony, *De Maasiers* ('The Mowes'), a *concerto for piano and orchestra*, several choral works with orchestra, piano pieces, and songs. He was also a voluminous and influential writer on musical subjects. Consult L. Mortelmans, *Pierre Benoit* (Antwerp, 1911).

BENOIT DE SAINTE-MORE, be-nwa' de sânt' mor', or DE SAINTE-MAURE (twelfth century) A French troubadour, born in the little village of Sainte-Maure, in Touraine. He was attached to the court of Henry II of England (1154-89), and in 1160 composed, at the request of Queen Eleanor, the *Roman de Troie*, (2 vols., 1869-71). His *Chronique des ducs de Normandie* (3 vols., 1837-42), composed about 1180 (probably at the request of Henry II), and consisting of about 45,000 octosyllabic verses, strongly eulogizes the Plantagenet dynasty. Benoit's other works include *Le Roman d'Enlais*, a continuation of the *Roman de Troie*.

BENRATH, bën'rat, KARL (1845-) A German Protestant theologian. He was born in Düren and studied at the universities of Bonn, Berlin, and Heidelberg. In 1871 he went to Italy, where for several years he devoted himself to scientific research. He became professor at the universities of Bonn (1879) and Königsberg (1890). Benrath was one of the founders of the *Rivista cristiana*. Among his theological writings, most of which are devoted to the history of the Reformation in Italy, the following are especially noteworthy: *Geschichte der Reformation in Venedig* (1887), *Bernardino Ochino von Siena* (1892), *Geschichte des Hauptvereins des Gustav-Adolf Stiftungs für Ostpreussen* (1894), *Julia Gonzaga* (1900), *Luther im Kloster, 1505-1525* (1905).

BENSERADE, ban's'-rad', ISAAC DE (1613-91) A French poet, born at Lions-la-Forêt (Normandy). He wrote verses for the interludes performed at the French court, a translation of the *Metamorphoses* of Ovid, and some formal tragedies. He is best known, however, for a sonnet on Job, written to accompany his paraphrase of the Book of Job. This sonnet was declared by many to rival Voltair's *Uranie*, and for a time the court was divided into "Jobelins" and "Uranins." Benserade's collected works appeared in 1697 (2 vols.). Octave Uzanne prepared a new edition of the poems (1875).

BENS'SHEE See BANSHÉE.

BENSLEY, ROBERT (?-c.1817) An English actor, chiefly remembered for his acting of the part of Malvolvo and for Charles Lamb's admiration of him. The facts of his history are very imperfectly recorded, though from 1765 till 1796 he was a well-known performer at the Drury Lane, Covent Garden, and Haymarket theatres. His first appearance, so far as known, was in *Venice Preserved*, his last was in *The Grecian Daughter* in 1796. The closing years of his life appear to have been spent in the quiet enjoyment of an inherited fortune. Consult Lamb, *Essays of Elia* (London, 1853).

BEN'SON A city in Douglas Co, Neb, 5 miles northwest of Omaha, on the Missouri River (Map Nebraska, H 3) It contains the St James Orphanage, Kiug Park, and a county club The surrounding region is fertile, agricultural land, producing corn, wheat, oats, flax, fruit, and vegetables The water works are owned by the city Pop, 1900, 610 1910, 3387

BENSON, ARTHUR CHRISTOPHER (1862-) An English essayist, biographer, literary critic, and novelist, son of Edward White Benson, a former Archbishop of Canterbury, and brother of Edward Frederick and Robert Hugh Benson Educated at Eton and at King's College, Cambridge, he became a fellow of Magdalen College, and was a master at Eton from 1885 to 1903 As a familiar essayist of rare refinement and charm he is at his best in *The Upton Letters* (1905) and *From a College Window* (1906) The critical biographies, *Rossetti* (1904), *Fitzgerald* (1905), and *Pater* (1906), well represent him as literary critic and biographer, and are marked by care, scholarship, and a generous yet discriminating appreciation Like his other works, they bespeak a spirit reverent to tradition, gentle, compromising, to which the crude and the radical are repugnant His poetry, finished and fine in form, is pensive and charged with a sentiment that can slip into sentimentality His novels, little given to action or incident, are brooding, meditative, and introspective In addition to the books named, and among many other works, he wrote *Memoirs of Arthur Hamilton* (1886), *Archbishop Laud* (1887), *Fasts Etonenses* (1899), *Life of Archbishop Benson* (1899), *Beside Still Waters* (1907), *At Large* (1908), *Poems* (collected, 1909), *Rushin* (1911), *The House of Quiet* (4th ed, 1910), *Joyous Gard* (1913)

BENSON, EDWARD FREDERICK (1867-) An English novelist, son of Edward White Benson, late Archbishop of Canterbury, and brother of Arthur Christopher Benson and Robert Hugh Benson He was educated at Marlborough, and at King's College, Cambridge Shortly after leaving the university he went to Athens and worked there for the British Archaeological Society from 1892 to 1895 Subsequently work for the Hellenic Society took him to Egypt While in Athens his career as a novelist began with the publication of *Dodo* (1893, 1912), a light irresponsible story that took the public fancy This novel gave him a place among the writers of clever fiction which he has since maintained Later novels, more substantial in form and treatment, have followed *Dodo* E F Benson is the author of a play, *Aunt Jeanne* (1912) He also published, among other books *Six Common Things* (1893), *Rubicon* (1894), *Limitations* (1896), *The Babe, B.A.* (1897, 1911), *The Relentless City* (1903), *The Chaloners* (1904, 1912), *An Act in a Backwater* (1905), *The Angel of Pain* (1906, 1912), *Sheaves* (1907), *The House of Defense* (1907, 1911), *The Chamber* (1908), *Daisy's Aunt* (1910, 1912), *Mrs Ames* (1912), *Bensoniana* (1912), *The Weaker Vessel* (1913), *Thorley Weir* (1913), *Dodo the Second* (1914)

BENSON, EDWARD WHITE, D.D. (1829-96) Archbishop of Canterbury He was born near Birmingham, England, July 14, 1829 He was graduated at Cambridge in 1852 and entered holy orders For some years he was a master at Rugby and held the head mastership of Wellington College from its opening, 1858, until

1872, when he was appointed a chancellor of Lincoln Cathedral In 1877 he was made the first Bishop of Truro, and on the death of Archbishop Tait (1882) was appointed his successor, being consecrated Archbishop of Canterbury, Primate of all England, March 29, 1883 He was one of the ablest in the long line of prelates His publications were mostly sermons, charges, and contributions to periodicals, but he completed just before his death at Hawarden, Oct 11, 1896, an elaborate study on *Cyprian, His Life, Times, and Work* (London, 1897), and indicative of his fine spirit are *Prayers, Public and Private, Compiled, Written, or Translated* (1899) Consult his *Life* by his son, Arthur Christopher Benson (London, 1899, abridged ed, 1901)

BENSON, EGBERT (1746-1833) An American jurist and author He was born in New York City, and in 1777 became a member of the first New York State Legislature He served in Congress (1784-88, 1789-93, and 1813-15), and was judge of the State Supreme Court from 1794 to 1801, when he became judge of the United States Circuit Court He was a regent of the University of New York (1789-92), first president of the New York Historical Society (1817-20) and the author of *A Vindication of the Captors of Major Andre* (1817) and *A Memoir on Dutch Names of Places* (1835)

BENSON, FRANK WESTON (1862-) An American portrait, figure, and landscape painter He was born at Salem, Mass, and studied in the art school of the Boston Museum, 1880-83, and under Boulanger and Lefebvre in Paris until 1885 In that year he established himself at Salem, at the same time giving instruction in Portland, Me In 1889 he became instructor in drawing and painting in the art school of the Boston Museum, in which position he has exercised a wide and wholesome influence upon painting Among his many honors are the gold medals of the Carnegie Institute, Pittsburgh (1903), St Louis Exposition (1904), and the Potter Palmer medal and prize, Chicago (1910) He also received the Shaw, Clark, and Hallgarten prizes of the National Academy of Design, New York, the Ellsworth prize in Chicago, etc He is a member of the National Academy and one of the "Ten American Artists" Benson is especially known as a painter of women and children, whom he depicts in bright and sunshiny scenes, usually out of doors with the sunlight falling through quivering leaves His paintings, in a high key and concerned largely with the rendition of light, include seven decorations in the Congressional Library, Washington, representing the "Seasons" and "The Three Graces" (1896), "My Little Girl" (1897), "In the Spruce Woods," "My Daughter," "Pomona" (1905), "Head of a Young Girl," "Against the Sky" (1907), "Eleanor" (1908), "Moonlight at Sea" (1908), "Portrait of Professor Clark" (1908)

BENSON, LOUIS FITZGERALD (1855-) An American hymnologist, born at Philadelphia He graduated at the University of Pennsylvania in 1877, studied law, and was admitted to the bar After a few years of legal practice he became a student in the Princeton Theological Seminary and in 1888 was ordained to the Presbyterian ministry During the following six years he was pastor of the Church of the Redeemer at Germantown, then resigning to devote himself to the subject of hymnology He made a collection of more than 6000 volumes relating to

his specialty, lectured on liturgies at the theological seminaries of Auburn (1902) and Princeton (1907 and 1910), and edited hymnals. Besides his contributions to reviews and to dictionaries of hymnology, he is author of *Hymns and Verses* (1897), *The Best Hymns—A Handbook* (1899), *Studies of Familiar Hymns* (1903), and editor of *The Hymnal* (1895), *The Chapel Hymnal* (1898), *The Revised Hymnal* (1911).

BENSON, ROBERT HUGH (1871–) An English Roman Catholic prelate and writer, son of Edward W. Benson, former Archbishop of Canterbury, and brother of Arthur Christopher and Edward Frederick Benson. He was born at Wellington College and was educated at Eton and at Trinity College, Cambridge. After leaving Cambridge he read for orders with Dean Vaughan, and became associated with the Community of the Resurrection at Mirfield. He was received into the Roman Catholic church in 1903 and in 1904 was ordained priest. After a year spent in further reading at Cambridge, he was appointed assistant priest at the Catholic church in that city. In 1911 he received the appointment of private chamberlain to Pope Pius X. He wrote much on religious subjects and also published several novels. His writings include, besides many articles in magazines and newspapers, *The Light Invisible*, *The King's Achievement*, *Richard Raynal*, *Solitary*, *The Queen's Tragedy*, *St Thomas of Canterbury*, *Non Catholic Denominations*, *Christ in the Church*, *The Dawn of All* (1911), *The Coward*, *The Friendship of Christ*, *Come Rack! Come Rope!* (1912), *Confessions of a Convert*, *Pardames of Catholicism*, and *An Average Man* (1913).

BENT, THEODORE (1852–97) An English traveler and archaeologist. He was born near Leeds and studied at Wadham College, Oxford. He made archeological journeys to Greece, Asia Minor, Abyssinia, Arabia, the Bahrein Islands, and South Africa, chiefly under the direction of the Royal Geographical Society. In 1891 he went to Mashonaland to examine and partially to excavate the ruins of the Great Zimbabwe, discovered by Mauch in 1871. His interesting report on the results achieved assigns to the ruins an Arabian origin. In 1894 he explored a portion of the southeastern coast of Arabia. His works include *The Oyclades, or Life among the Insular Greeks* (1885), *The Ruined Cities of Mashonaland* (1892), *The Sacred City of the Ethiopians* (1893). He also edited for the Hakluyt Society a volume on *Early Travels in the Levant*.

BENT, SILAS (1820–89) An American naval officer who first delineated and described the Kuro Shiu, the great equatorial and northward stream of the Pacific, which distributes the hot water of the tropics into northern regions. He was born in St. Louis, entered the United States navy as midshipman in 1836, served in the Seminole War, voyaged in the South Pacific, and was especially active on survey work. He was on the brig *Peble*, under Commander Glynn, who, in February, 1849, at Nagasaki, Japan, procured the release of 18 American sailors, who had been kept prisoners. He served as captain and flag lieutenant under Commodore M. C. Perry from 1852 to 1856. In this expedition he had charge of those hydrographic surveys which ultimately became the basis of the later work by the Japanese navy. He piloted the fleet into Napha, in the Lu-Kiu

(Loo-choo) Islands, and was a commissioner for the United States in making a treaty with the Regent.

BENTANG See **ERIODENDRON**

BENT GRASS (AS *beonet*, found in composition only, OS *brunt*, OIH *bruz*, Ger *Banse* rush, possibly OHG *bi*, by *† naz*, Ger *nass*, wet, literally that which grows in wet places). *Agrostis*. A genus of grasses, the species of which are numerous and are found in almost all countries and climates. All of them are grasses of a slender and delicate appearance. Some are very useful as pasture grasses and for hay on account of their adaptation to certain kinds of soil. The species *Agrostis alba*, *Agrostis vulgaris*, and *Agrostis stolonifera* are often separated, although the last two are little more than varieties of *Agrostis alba*. The common bent grass or red top (*Agrostis vulgaris*) forms a principal part of the pasture in almost all the elevated districts of Great Britain and is equally abundant in many parts of the continent of Europe and in the northern part of the United States. It resists drought better than almost any other grass, but is usually only sown by agriculturists on soils unsuitable for the more luxuriant grasses. It is also regarded as very suitable for lawns. It is as frequent on wet as on dry soil and varies much in size and appearance. The marsh bent grass (*Agrostis alba*), also very common in Great Britain, forming a large part of the natural pasture in many moist situations, is very similar to the species just described, but generally taller and stouter. It is a useful grass in moist grounds, newly reclaimed bogs, or land liable to inundation. The first three or four joints of the culms lie flat on the damp soil, emitting roots in abundance, and it was formerly propagated by chopping these into pieces and scattering them, but now generally by seed. Creeping bent grass, cultivated for lawns, is *Agrostis stolonifera*. Brown bent grass (*Agrostis canina*), a common perennial British grass, abundant in moist heaths and marshy grounds, is valuable for mixing with other grasses to form permanent pasture on poor, wet, peaty soils. In the United States it is commonly known as Rhode Island bent grass and is considered one of the best of lawn grasses. Silky bent grass (*Agrostis spica venti*) is a beautiful grass, with very slender branches to its ample panicle. It is a rare native of sandy grounds in England, common in southern and central Europe, it is an annual grass, occasionally sown in spring to fill up blanks in grass fields.

BENTHAM, bēn'tam or bēn'tham, GEORGE (1800–84) An English botanist, a nephew of Jeremy Bentham (q.v.). He was born at Stoke, near Plymouth, and studied law at Lincoln's Inn until 1832, but afterward devoted himself to botany. In 1861 he became president of the Linnean Society and held this position continuously for 13 years. Besides his interest in botany he was a profound student of jurisprudence and logic as well. His *Outline of a New System of Logic, with a Critical Examination of Dr. Whately's Elements of Logic* (1827) was an important contribution to the science, but owing to the failure of his publishers, the book passed unnoticed until 1850. Some of his other works are *Labradorum Genera et Species* (1832–36), *Handbook of the British Flora* (1858 and 1865), *Flora Hongkongensis* (1861), *Flora Australensis*, in collaboration with Ferdinand von Müller

(5 vols, 1863-70) *Genera Plantarum*, with Sir Joseph Hooker (1862-83)

BENTHAM, JEREMY (1748-1832) An English jurist and philosopher. He was the son of a wealthy solicitor in London, received his early education at Westminster School, and when yet a boy, being little more than 12 years of age, went to Queen's College, Oxford, where he took his bachelor's degree in 1763 and his master's degree in 1766. Before entering it, he had already, by his precocious tendencies to speculation, acquired the title of "the philosopher." In 1763 his father, who expected his son to become Lord Chancellor, sent him to the study of the law at Lincoln's Inn, but soon afterward he went back to Oxford, attracted by the fame of Blackstone's (qv) lectures. In 1767 he left Oxford to begin a legal career, but, much to the disappointment of his father, he had no relish for it and took no pains to succeed in it. He studied chemistry and physics when he was expected to be working up cases. Turning from the practice of law to its theory, he became the greatest critic of legislation and government in his day. In 1776 he published *A Fragment on Government*, which was an acute criticism of some views contained in Blackstone's *Commentaries*. The *Fragment* abounds in fine, original, and just observation, it contains the germs of most of his later writings. In 1778 he published *View of the Hard Labor Bill*, recommending an improvement in the mode of criminal punishment. His views on this subject were more fully expressed in a work written about this time, but not published in English till 1825, the *Rationale of Punishment and Rewards*. Bentham did more than any other writer of his time to rationalize the theory of punishments by consideration of their various kinds and effects, their true objects, and the conditions of their efficacy. He published in 1789 *Introduction to the Principles of Morals and Legislation*; in 1791, *The Panopticon, or the Inspection House, Manual of Political Economy* was written; in 1793, *Poor Laws and Pauper Management* was published; in 1797, *Introductory Views of the Rationale of Evidence* was printed in part; in 1812 *The Rationale of Judicial Evidence* (edited by J S Mill, London, 1827) was another and a fuller presentation of the same subject. Many works of various dates bear upon the subject of codification of the laws. His *Constitutional Code*, one of his most important works, was published in full in 1841, under the editorial supervision of R Doane. The subject of logic also interested Bentham, and he wrote a treatise on it, *Deontology, or the Science of Morality*, was edited and published by Bowring in 1834. His works were collected and edited by Bowring, and published with life and correspondence in 11 volumes (Edinburgh, 1843). A great mass of unpublished manuscript from Bentham's pen is to be found in the library of University College, London. Much of what came to light in Bentham's lifetime was edited by his friends, and some of it appeared first in French under the supervision of Dumont. Bentham had a habit of writing on various subjects at the same time, the result was an aggregation of manuscripts that required sifting, and he was fortunate in finding men of ability like Dumont to undertake his work. In his early works Bentham's style was clear, free, spirited, and often eloquent, but in his later works it became difficult, through being overloaded and

darkened with technical terms. In regard to these latter works more especially, M Dumont has most materially served his master by arranging and translating them into French, through the medium of which language Bentham's doctrines were propagated throughout Europe, till they became more popular abroad than at home. James Mill, himself an independent thinker, did much in his writings to extend the application in new directions of Bentham's principles—a work in which, apart from his original efforts, he has achieved a lasting monument of his own subtlety and vigor of mind. Another valuable contribution in English to Bentham's reputation is perhaps *Benthamiana*, by John Hill Burton (Edinburgh, 1843), containing a memoir, selections of the leading and important passages from his various writings, and an appendix embracing an essay on his system and a brief, clear view of all his leading doctrines.

In all Bentham's ethical and political writings the doctrine of utility is the leading and pervading principle, and his favorite vehicle for its expression is the phrase "the greatest happiness of the greatest number," which Bentham attributed to Priestley (qv), but which really dates back to Hutcheson's (qv) *Enquiry into the Original of Our Ideas of Beauty and Virtue*, which appeared as early as 1725. "In this phrase," Bentham says, "I saw delineated for the first time a plain as well as a true standard for whatever is right or wrong, useful, useless, or mischievous in human conduct, whether in the field of morals or of politics." It need scarcely be remarked that the phrase affords no guidance as to how the benevolent end is to be attained and is no more than a blanket name for the objects of true benevolence. In order to compass these objects, Bentham demanded nothing less than the immediate remodeling of the government, and the codification and reconstruction of the laws, and insisted, among other changes, on those which came at a later day to be popularly demanded as the points of the "charter," viz, universal suffrage, annual parliaments, vote by ballot, and paid representatives. However impossible some of these schemes then were, it cannot be denied that Bentham did more to rouse the spirit of modern reform and improvement in laws and politics than any other writer of his day. Many of his ideals have been, and many more are in the course of being, slowly realized. The end and object of them all was the general welfare, and his chief error, apart from his overstatement of the value of some changes which he proposed, lay in conceiving that organic changes are possible through any other process than that of growth and modification of the popular wants and sentiments. It was this error that led the philosopher, in his closet in London, to devise codes of laws for Russia (through which country he made a tour in 1785), America, and India, the adoption of which would have been equivalent to revolutions in those countries, and then bitterly to bewail the folly of mankind when his schemes were rejected. In ethics, as in politics, he pressed his doctrines to extremes. See UTILITARIANISM, HEDONISM.

By the death of his father in 1792 Bentham succeeded to property yielding from £500 to £600 a year. By a life of temperance and industry, with great self-complacency, in the society of a few devoted friends, Bentham attained to the age of 84. Consult C B R Kent, *The*

English Radicals (London, 1899), W. Graham, *English Political Philosophy, from Hobbes to Maine* (London, 1899), J. S. Mill, "Bentham," in *London and Westminster Review* (August, 1838), L. Stephen, *English Utilitarians* (London and New York, 1900), Albee, *History of English Utilitarianism* (London, 1902), C. M. Atkinson, *Jeremy Bentham His Life and Work* (London, 1905, 2d ed., 1909).

BENTHOS (Gk *βένθος*, *benthos*, the depth of the sea). In botany, the fixed vegetation of the sea or of great lakes, in contrast with the floating vegetation or plankton (qv). Benthonic plants are in large part attached to rocks, in which case they are called lithophytes. The lithophytic members of the benthos are chiefly algae, and it is here that the wonderful display of marine plants of our ocean coasts is found. The benthos may be subdivided into the regions above and below the low tide line. Above this line the vegetation is relatively sparse, and is composed of plants which are able to endure strong exposure during the period of low tide. Along the North Atlantic coast the rockweed (*Fucus*) is one of the most characteristic plants of this zone. Below low tide is the zone of constant submergence, and here the benthos finds its richest development. Red, brown, and green algae, and sometimes other plants, grow in vast profusion. In the upper parts of this zone the brown and green algae often dominate, while red algae dominate at greater depths. Deeper in the water all of these large plants cease.

The ecology of the benthos has been studied by Berthold and Kjellman. In the Mediterranean there are seasons which are determined by light, surface forms vegetating early in the year, while the algae of deeper waters vegetate in summer. One of the surprises of the northern seas is the rich development of plant life, the brown algae being particularly common. Here the seasons depend rather upon heat than light. Most of the benthonic lithophytes have well-developed holdfast organs ("hapteria") attaching them to rocks, and many forms are provided with bladders which permit free floating in the water.

Less conspicuous than the rock plants are the plants attached to loose soil. A few algae like *Caulerpa* are classed here, but perhaps the most prominent plant of this group is the eelgrass (*Zostera*), which often forms vast submarine meadows. The benthos of fresh waters is not well developed, or, if present, has a different ecology. See **HYDROPHYTES**, **ECOLOGY**.

BENTINCK, LORD WILLIAM CAVENDISH (1774-1839). A British army officer and Governor General of India. He was born Sept. 14, 1774, the second son of the third Duke of Portland, and became an ensign in the Coldstream Guards in 1791. He was, in 1803, appointed Governor of Madras, where he advocated several useful reforms. His proscription of beards and wearing of turbans and earrings by the sepoys when on duty was said to have caused the mutiny and massacre at Vellore, and he was recalled. In August, 1808, he was placed on the staff of the army in Portugal under Sir Harry Burrard. Selected to proceed on an important mission to the supreme Junta of Spain, he accompanied the army under Sir John Moore in its retreat and at Corunna commanded a brigade. He next commanded a division of Wellington's army and shortly after was sent as

British Minister to the court of Sicily and commander in chief of the British forces in that island. At the head of an expedition he landed in Catalonia in July, 1813, penetrated to Valencia, and afterward laid siege to Tarragona, but was repulsed at Villa Franca. Early in 1814, quitting Sicily, he repaired to Tuscany, published at Florence a proclamation inviting the Italians to shake off the French yoke, and afterward made himself master of Genoa. At the end of the war he lived in retirement during thirteen years. In 1827 he was appointed Governor General of India, where, profiting by his prior experience, he pursued a peaceful and popular policy, his administration being especially marked by the abolition of suttee (qv) and by the opening up of internal communications, as well as by the establishment of the overland route. After his return to England, in 1835, he was elected a member of Parliament for Glasgow. He died in Paris, June 17, 1839. Consult Boulger, *Lord William Cavendish Bentinck* (Oxford, 1892).

BENTINCK, LORD WILLIAM GEORGE FRÉDÉRIC CAVENDISH (1802-48). An English statesman and sportsman, widely known as Lord George Bentinck. The third son of the fourth Duke of Portland, he was born at Welbeck Abbey, Feb. 27, 1802, and entered the army when young. For three years after Canning became Premier, Lord George was his private secretary. He was distinguished for his skill in every sport and became famous for the purification that ensued in the corrupt practices of the turf, through the reforms that he instituted. In 1826 he was elected member of Parliament for Lynn-Regis and sat for that borough till his death. At first, attached to no party, he voted for Catholic emancipation and for the principle of the Reform Bill. A determined opponent of Sir Robert Peel, on the formation of that statesman's ministry in December, 1834, he and his friend Lord Stanley, afterward Earl of Derby, with some adherents, formed a separate section in the House of Commons. On the resignation of Sir Robert Peel in April following, Lord George openly joined the great Conservative party, which acknowledged that statesman as its head, and he adhered to it for nearly 11 years. When Peel introduced his free-trade measures in 1845, a large portion of his supporters seceded, and Lord George became the leader of the Protectionists. Although a poor speaker, he was a master of figures and detail. His acute logic was damaging to the government of Sir Robert Peel and contributed in no small degree to hasten its downfall. A champion of religious liberty, Lord George supported the bill for the removal of the Jewish disabilities and recommended the payment of the Roman Catholic clergy by the landowners of Ireland. He died suddenly from rupture of the heart, Sept. 21, 1848, while crossing the park at Welbeck Abbey. Consult B. Disraeli, *Lord George Bentinck. A Political Biography* (London, 1851).

BENTIVOGLIO, bēn'tā-vō'lyō, GIOVANNI (1443-1508). An Italian ruler, born at Bologna. He usurped the control of the Republic of Bologna, which he held from 1462 to 1506. Like many of the despots of the time, he was cruel, but a patron of the fine arts. Consult M. Creighton, *History of the Papacy* (London, 1897).

BENTLEY, JOHN FRANCIS (1839-1902). An English architect, born at Doncaster. He began

independent practice in 1802, and was in full sympathy with the Gothic revival in England. His best works were Catholic churches, in which the accessories were especially successful. In 1894 he began the erection of the new Roman Catholic cathedral in Westminster, the structural part of which only was finished at his death.

BENTLEY, RICHARD (1662-1742) An English critic and classical scholar. He was born at Oulton, in Yorkshure, Jan 27, 1662. In 1676 he entered St John's College, Cambridge, as subsizar. On leaving the university he was appointed head master of the grammar school of Spalding, Lincolnshire. About a year afterward he resigned this situation to become tutor for six years to the son of Dr Stillingfleet, then dean of St Paul's, and subsequently Bishop of Worcester. During this period Bentley had the advantage of access to the books of Dr Stillingfleet, who had one of the largest private libraries of the time. Bentley accompanied his pupil to Oxford, where he had full scope for the cultivation of classical studies, and that he succeeded in acquiring there some local reputation is evinced by his having been twice appointed to deliver the Boyle Lectures (qv) on the evidences of natural and revealed religion (1692-94). He was on intimate terms with such famous scholars as John Mill, Humphrey Body, and Edward Bernard. He entered the Church, and owed to the patronage of Dr Stillingfleet, now the Bishop of Worcester, various good ecclesiastical appointments, and through the same influence became librarian of the Royal Library at St James's. In 1691, when Mill edited the *Chronicle* or Compendium of Universal History down to 650 A.D. of John of Antioch, called John Malalas, he invited Bentley to read the proofs. As an Appendix to the edition was printed, finally, the *Epistola ad Miltum*, in which Bentley emended, with great skill, corrupt passages in the *Chronicle*, and at the same time corrected many passages in more than 60 authors, Greek and Latin, especially in the Attic dramatists. In this short piece of less than 100 pages, his first published work, Bentley may be said to have founded, for England, the science of text criticism. In this treatise, too, he proclaimed the doctrine of synaphea in anapestic systems, i.e., that scansion in these systems is continuous, and not interrupted at the close of each verse. In 1697 Bentley appended to the edition of Callimachus by Grævius a series of 420 fragments of that author, with notes, a marvel of critical skill. In the famous *Battle of the Books* (qv) Bentley sided with Wolton, assuring him that the so-called Epistles of Phalaris, on which Temple had largely relied in asserting the superiority of the ancients, were neither old writings nor good. As a result of the activities of Boyle (qv) in the *Battle of the Books*, Bentley brought out, first in 1697, then in 1699 in revised form, his *Dissertation on the Epistles of Phalaris*, in which he showed conclusively, on chronological grounds, that the Epistles were not written till centuries after Phalaris' time. He pointed out, too, that the language of the Epistles was Attic Greek, whereas a King of Agrigentum would have written in Doric Greek. In this *Dissertation* he discussed also the so-called fables of Æsop, proving that many of them, at least, belonged to a day much later than that commonly assigned to Æsop. (See

BABRIUS.) Though the Dissertation was not at first rated in England at its true value, it presently established for all time Bentley's reputation as a master of critical method and as a scholar of profound learning.

In 1700 Bentley was appointed master of Trinity College, Cambridge, and in the following year he married Mrs Joanna Bernard, the daughter of a Huntingdonshire knight. The history of Bentley's mastership of Trinity is the narrative of an unbroken series of quarrels and litigations due to the fact that between Bentley, self-confident and arrogant by nature, devoted primarily to the cause of truth and sound classical learning, and the indolent and luxurious Fellows of his time, sympathy was impossible. In 1710 charges were put in against him, before the visitor, Dr Moore, nothing, however, came of them. In 1718 he was deprived of his degrees by the University, but these were restored to him by legal process in 1724. In 1733 charges were again preferred against him, and the feud lasted till 1740. He contrived, nevertheless, to get himself appointed regius professor of divinity. Though at one time the Bishop of Ely, the visitor of Trinity, pronounced sentence depriving him of his mastership, and though at another the senate of the university pronounced a similar sentence depriving him of his academic honors, he remained in full possession of both the former and the latter till his death. This stormy life did not impair his literary activity. In 1709 he added an appendix to the edition of Cicero's *Tusculan Disputations*, by John Davies, in this he proved his knowledge of the philosophical works of Cicero and of the metres of the Latin dramatists, from whose plays many quotations appear in the *Tusculans*. In 1711 he published his edition of Horace, famous for his bold though seldom successful handling of the text, it was in this book he declared that "nobis et ratio et res ipsa centum codicibus potiores sunt." In 1726 he issued an edition of Terence, containing 1000 emendations more or less, largely on metrical grounds. In this work appeared his famous *Schediasma* on the metres of Terence. While working on an edition of Homer (1732-34), he called attention to the importance of the digamma, in correcting the Homeric text and in explaining the metre. He produced, finally, a recension of the Latin poet Manilius (qv).

Bentley's greatness was speedily recognized on the continent of Europe. He was on terms of friendship with Grævius and for a time with Pieter Burman. In the seventeenth and eighteenth centuries Dutch classical scholarship owed much to Bentley. Modern German classical scholars know him as they know no other Englishman.

Great as Bentley's actual achievements were (only part of his writings has been considered above), he is as much celebrated for what he proposed as for what he actually performed. The proposal to print an edition of the Greek New Testament in which the received text should be corrected by a careful comparison with all the existing manuscripts was then singularly bold and evoked violent opposition. He failed in carrying out his proposal, but the principles of criticism which he maintained have since been triumphantly established and have led to important results in other hands. He is to be regarded as the founder of that school of classical criticism

of which Poison afterward exhibited the chief excellences as well as the chief defects, and which, though it was itself prevented by too strict attention to minute verbal detail from ever achieving much, yet diligently collected many of the facts which men of wider views have since grouped together, to form the modern science of comparative philology. Consult. Monk, *Life of Richard Bentley* (London, 1833), Jebb, 'Bentley,' *English Men of Letters Series* (New York, 1882), Sandys, *A History of Classical Scholarship*, vol. II (Oxford, 1908), Bartholomew and Clark, *Bibliography of Bentley* (Cambridge, 1908).

BENTLEY, ROBERT (1821-93) An English botanist, born at Hitchin (Hertfordshire). He studied medicine and botany at London University and was professor at King's College and the London Institution. He was also associate editor of the *Pharmaceutical Journal* and collaborator on the English edition of Pereira's *Materia Medica and Therapeutics* (1854-55). His principal works are the following: *A Manual of Botany* (1861, frequently republished), *Principal Plants Employed in Medicine* (1875 et seq., profusely illustrated), *The Student's Guide to Structural, Morphological, and Physiological Botany* (1883), *A Text-book of Organic Materia Medica*.

BENTON A city and the county seat of Franklin Co., Ill., 125 miles southwest of Springfield, on the Illinois Central, the St. Louis, Iron Mountain and Southern, and the Chicago and Eastern Illinois railroads (Map Illinois, D 5). The city contains a branch station of the Illinois Mine Rescue Service, and the old homestead of Gen. John A. Logan. It has important coal-mining interests and manufactures of stoves. Benton adopted the commission form of government in 1913. Pop., 1890, 939, 1900, 1341, 1910, 2675.

BENTON, ANGELO AMES (1837-) An American clergyman, born at Canaan, Crete. He graduated at Trinity College, Hartford, Conn., and at the General Theological Seminary, New York. He was professor of dogmatic theology at the University of the South (1887-94), and rector at Albion, Ill., in 1905. He published *The Church Cyclopædia* (1884) and *The Tome of St. Leo* (1890).

BENTON, FRANK (1852-) An American apiculturist, born at Coldwater, Mich. He graduated at the Michigan Agricultural College in 1879 and later studied abroad at Munich and Athens. After spending 11 years in the investigation of bees in Asia, Africa, and Europe, he became assistant entomologist and special agent of the United States Department of Agriculture (1891). In this position he remained for 10 years. While investigator for the government, in charge of apiculture (1901-07), he spent some time in making investigations in the Caucasus, Persia, India, and the Philippine Islands. After serving as naturalization examiner in 1907-08, he became editor and translator for the Department of Commerce. Benton was the first American to import Oriental bees, and he also invented many apian appliances. In addition to his magazine articles dealing with his specialty, he is the author of *The Honey Bee* (1896) and *Bee Keeping* (1897, rev. ed., 1905).

BENTON, GUY POTTER (1865-) An American educator and clergyman, born at Kenton, Ohio. He was educated mainly at Ohio,

Wesleyan, and Baker universities, but studied also at the University of Wooster and in Berlin. After being superintendent of schools at Fort Scott, Kan., and assistant superintendent of public instruction in that State, he became professor of history and sociology at Baker University (1896), and then in turn president of Upper Iowa University (1899), Miami University (1902), and the University of Vermont (1911). The degrees of D.D. and LL.D. were conferred upon him by several universities. He published *The Real College* (1909).

BENTON, JAMES GILCHRIST (1820-81) An American soldier and inventor. He was born at Lebanon, N. H., and was graduated at West Point in 1842. He was commandant of the Charleston (S. C.) arsenal in 1853 and for several years was instructor in ordnance and gunnery at West Point, where he perfected a wrought-iron gun carriage for seacoast service, the first of its kind constructed in America. This carriage was immediately adopted by the Federal government. Upon the outbreak of the Civil War Benton was transferred to the Ordnance Department at Washington and in 1863 was placed in command of the Washington arsenal. In 1866 he was transferred to the national armory at Springfield, Mass., where he remained as commandant until his death. The use of the electro-ballistic machine or chronograph for determining the velocity of projectiles was introduced by Benton, and the successive improvements in the Springfield rifle were also mainly due to his inventive skill. Among his other inventions were improved calipers for inspecting shells, a velocimeter, a spring dynamometer, an electro-ballistic pendulum, a cap-filling machine, and a reinforcing cap for cartridge cases. He published *A Course of Instruction in Ordnance and Gunnery* (1860).

BENTON, THOMAS HART (1782-1858) An American statesman of the Jacksonian epoch. He was born, of good family, near Hillsborough, N. C., and on the death of his father, his mother, a woman of character and of ambition for her son, took the boy to Tennessee. Here he studied law and was soon elected to the Legislature, where he did work as a reformer. Andrew Jackson became his friend, but in 1813 they had a remarkable encounter, Jackson getting a ball in his shoulder from Benton's brother, and Benton being thrown downstairs. Jackson and Benton were reconciled many years later. In the War of 1812 he was given a lieutenant colonelcy, but did not serve effectively. Shortly after the secession agitation of the Hartford Convention, Benton became a pronounced Union man, and he held to this position. In 1815 Benton settled in St. Louis, and established the *Missouri Inquirer*, a journal that occasioned for him a number of duels, in one of which he killed his opponent. He advocated the admission of Missouri as a slave State, and after the famous compromise in 1820 was chosen United States Senator. He was regularly reelected, so that he was Senator for 30 successive years. One of his long-prosecuted plans was to amend the Constitution so that the people could vote directly for President or come as near as possible to such a system. One of his hardest fights was in opposition to the rechartering of the United States Bank. He advocated instead the establishment of a currency of gold and silver only, for which idea he was long called "Old Bullion." After Jackson's removal of Secretary Duane in the fight

against the Bank, the Senate adopted a resolution censuring the President but Benton, who in many ways was Jackson's lieutenant, not long after moved to expunge that resolution from the record and carried his point after a long and fierce contest. Among other measures advocated by Benton were the preemption of public lands, a railroad to the Pacific, the abolition of the salt tax, and opening mineral lands to settlement. In the Oregon boundary dispute with Great Britain he took a leading part against the "fifty-four-forty or fight" advocates, and his influence greatly conduced to the retreat of Polk's administration from an extreme position. He was of service to Polk during the Mexican War, and it was actually proposed at one time to put him in command of the forces in the field. He opposed Calhoun's proslavery propaganda and the compromise measures of Henry Clay in 1850. As a result of his hostility to Calhoun and the proslavery Democrats he lost his senatorship. Two years after his long service in the Senate ended, he was chosen to the other House, where he opposed the Kansas-Nebraska bill and failed of reelection on that account. In 1856 he was a candidate for Governor of Missouri, but lost through the presence of a third ticket in the field. At the same election he supported Buchanan for President, although his son-in-law, J. C. Fremont, the husband of Miss Jessie Benton, was the opposing candidate, so that the Republican catchword in this campaign was "John and Jessie." His *Thirty Years' View* (1856) is a well-known and valuable political retrospect of his experiences and observations in the Senate. He also made a notable *Abridgment of the Debates in Congress from 1789 to 1850*, in 15 large volumes (1857). Consult W. M. Meigs, *Life of T. H. Benton* (Philadelphia, 1904), J. M. Rogers, *Thomas H. Benton* (Philadelphia, 1905), Roosevelt, *Thomas Hart Benton* (Boston, 1887).

BENTON GROUP. See CRETACEOUS SYSTEM.

BENTON HARBOR. A city in Berrien Co., Mich., about 60 miles by water east-northeast of Chicago, Ill., on the St. Joseph River, and on the Pere Marquette, the Cleveland, Cincinnati, Chicago and St. Louis, and the Michigan Central railroads (Map Michigan, C 6). It is $1\frac{1}{2}$ miles from Lake Michigan, with which it is connected by a ship canal, has a good harbor on the lake, with steamboat lines to Chicago and Milwaukee, and exports large quantities of fruit, grain, and lumber. The manufactures include fruit packages, furniture, flour, spray pumps, planed lumber, machinery, etc. In the city and the vicinity are mineral springs with medicinal properties, which make it popular as a place of resort. The water works are owned by the city. Bottled water is shipped in considerable quantities. Pop., 1900, 6562, 1910, 9185.

BENTONVILLE. A city and the county seat of Benton Co., Arkansas, about 72 miles (direct) north by east of Fort Smith; on the St. Louis and San Francisco Railroad (Map Arkansas, A 1). It contains the Ouachita Baptist Academy and several springs, three of which have medicinal properties. The city is the center of one of the most productive apple-growing regions in the United States; it also carries on a considerable trade in fruit, timber, grain, and live stock, and has extensive fruit-evaporating works and fruit-brandy distilleries, a cold storage plant, barrel factories, a rolling mill, a cider and vinegar factory, and brick works.

Bentonville owns its water works and electric light plant. Pop., 1900, 1843, 1910, 1956.

BENTONVILLE. A village in Johnston Co., N. C., where, on March 19, 1863, a Confederate force of about 15,000, under Johnston, vigorously attacked the left wing of Sherman's army, under General Slocum, but was repulsed, with the aid of Kilpatrick's cavalry, after several hours of stubborn fighting. Substantial Federal reinforcements from the main army having arrived during the day, Johnston did not renew the attack, and on the night of the 21st hastily retreated towards Raleigh, while Sherman proceeded to Goldsboro to effect a junction with Schofield. The Federal loss in killed, wounded, and missing was about 1600, the Confederate about 2700. Consult Johnson and Buel, *The Battles and Leaders of the Civil War*, vol. iv (New York, 1887).

BENTZEL-STERNAU, bën'tsel stér'nou, KARL CHRISTIAN ERNST, COUNT (1767-1840). A German statesman and author, born at Mainz. He was successively Minister of the Interior of the Grand Duchy of Baden (1808), president of the Supreme Court at Mannheim (1810), and Minister of State and Finance of the Grand Duchy of Frankfurt (1812). He became famous as a humorist and close student of human nature through his anonymous novel, *Das goldene Kalb* (4 vols., 1803-04), in which he imitates the romanticism of Jean Paul. This was followed by *Der steinerne Gast* (1808), *Pignambriefe* (1811), and *Der alte Adam* (1819-20). The dramatic works of the author were less successful, while his *Bayenbriefe* were characterized by political insight and patriotism. He also translated Young's *Night Thoughts*.

BENTZON, bän'tsôn, THÉRÈSE. The pseudonym of Marie Thérèse Blanc (1840-1907). A French journalist, essayist, and novelist, for many years on the staff of the *Revue des Deux Mondes*. She was born at Seine-Port, traveled widely in the United States, and wrote wisely of American literature and social conditions. Among her essays are *Littérature et mœurs étrangères* (1882) and *Les nouveaux romanciers américains* (1885). Her novels include *La vocation de Louise* (1873), *Sang mêlé* (1875), *Un remords* (1878), *Cette histoire d'une jeune Gréole* (1880, 1882), *Yvonne* (1881), *Tony* (1884), crowned by the French Academy, *Contes de tous les pays* (1890), *Jacqueline* (1893), *Une double épreuve* (1896), *Au dessus de l'abîme* (1905). She also wrote *Nouvelle France et Nouvelle Angleterre*, *Notes de Voyage* (1899), *Choses et gens d'Amérique*, *Questions Américaines*, and *Femmes d'Amérique*, and translated works by Dickens, Bret Harte, Ouida, Aldrich, and other novelists.

BENUE, bën'we, or **BINUE**. A river of West Central Africa and the largest tributary of the Niger (Map Africa, E 4). It rises in southern Adamawa, in about lat. 7° $30'$ N. and long. 13° $45'$ E. It flows generally westward and after a course of about 900 miles joins the Niger 300 miles from the coast, in about lat. 8° N. Its width in its lower course varies from about 1600 to 3200 feet, and its navigable length exceeds 600 miles during the wet season, but during the dry season, January to May, it is very shallow. Its chief tributaries are the Mayo Kebbi, Gongola, Kadera, Tarabba, and Faro. The Benue River was known to Europeans as early as 1831 and was then supposed to be connected with Lake Chad. In 1851 it was partially explored by Barth, who made an investigation of

its upper stream and exploded the theory of its being connected with Lake Chad. In 1854 another expedition under Baikie explored the river as far as Dulti, about 350 miles above its confluence with the Niger. In 1879 the explorer Robert Hegel journeyed along the Benue through its entire navigable length and explored some of its tributaries. The expedition of Mizon, in 1892, made our knowledge of the river very complete. By an agreement between Germany and Great Britain the freedom of navigation on the Benue was guaranteed. The Niger and the Benue rivers together form the only navigable route in Africa from the ocean to the far interior.

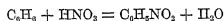
BENWELL AND FENHAM A municipality in Northumberland, England, on the Tyne, $2\frac{1}{2}$ miles west of Newcastle. Coal mining is the leading industry. Pop., 1891, 10,500, 1901, 18,350, 1911, 17,265.

BENWOOD A town in Marshall Co., W. Va., on the Ohio River, adjoining Wheeling, and on the Baltimore and Ohio and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map West Virginia, D 1). The principal manufactures are iron and steel skelp and pipe. About a mile south of the town is a government dam, built to hold the Ohio River in a navigable condition during dry periods. Benwood was settled about 1800. Pop., 1900, 4511, 1910, 4976.

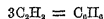
BENZALDEHYDE, or **OIL OF BITTER ALMONDS**, C_6H_5CHO . The cake which is left after the expression of the fixed oil from bitter almonds contains, among other matters, two substances called, respectively, amygdalin and emulsin or synaptase. When the cake is bruised and made into a paste with water, the emulsin acts as a ferment upon the amygdalin, splitting it up into the volatile oil of almonds, hydrocyanic (prussic) acid, and grape sugar. The oil is not originally present in the bitter almonds, in fact, the latter do not contain a trace of the oil ready formed, so that the oil is purely a product of the fermentation of amygdalin. This action takes place very rapidly and is complete in 24 hours. The paste yields, by distillation, a product containing benzaldehyde, partly combined hydrocyanic acid, and water. The hydrocyanic acid may be removed from this by means of ferrous chloride and lime. It is colorless, has an agreeable odor, and an acid, bitter taste. It is soluble in water to the extent of 1 part in 300 parts of water, but mixes in all proportions with alcohol and ether. It is a highly refractive liquid, of specific gravity 1.05 at $15^\circ C$, it boils at $179^\circ C$. It is usually prepared by boiling benzyl chloride with an aqueous solution of lead nitrate. The crude product thus obtained is shaken with a solution of acid sodium sulphite, which forms a crystalline compound with benzaldehyde, while the impurities remain in solution. Pure benzaldehyde is obtained from the crystalline compound by the action of dilute acids. The oil is used by confectioners and perfumers and also in the manufacture of various dyes, etc. Exposed to the air, benzaldehyde gradually changes by oxidation into benzoic acid. Strong potassium hydroxide changes it partly into benzoic acid, partly into benzyl alcohol.

BENZENE, or **BENZOL** (for derivation see **BENZOIN**), C_6H_6 . One of the most important of the compounds of carbon. Large quantities of it are industrially converted into nitrobenzene,

from which, in turn, all of the aniline or commerce is manufactured. The luminosity of a coal-gas flame is partly due to the presence of benzene in the gas. Benzene is an excellent solvent for fats, resins, iodine, and other substances. The importance of benzene in pure chemistry is due to the fact that a very large number of substances are derived from it, the derivatives constituting the so-called *aromatic compounds*. Benzene may be obtained in a variety of ways. It is produced by passing the vapors of ordinary alcohol, ether, and many other organic substances through a tube heated to redness, it is one of the constituents of the tar obtained by heating wood, peat, and shale out of contact with air. Faraday first discovered it (1825) in oil gas, and in 1845 Hofmann found it in coal tar, from which all the benzene of commerce is at present obtained. The process by which benzene is obtained industrially was first worked out by a pupil of Hofmann's, Charles Mansfield, whose death was caused (1856) by a large quantity of benzene taking fire during distillation. Most of the benzene produced by the destructive distillation of coal forms a constituent of illuminating gas, while the remaining benzene is found in the portion of the coal-tar that distills over below $170^\circ C$. When this portion, called *light oil*, is redistilled, a liquid consisting mainly of benzene and a similar substance called toluene passes over between 82° and $110^\circ C$. This portion is purified by washing consecutively with sulphuric acid, water, and soda, it is then subjected to further fractional distillation. In this manner somewhat impure benzene is obtained. To purify it, the liquid is cooled to crystallization, and the benzene crystals are separated and again distilled. Thus benzene is rendered pure enough for all practical purposes. It still contains, however, a small quantity of thiophene (C_4H_4S) whose presence may be best demonstrated by the so-called indophenol reaction, causing a blue coloration to appear when a little sulphuric acid and isatin are added to ordinary benzene. As thiophene is more readily soluble in sulphuric acid than benzene, it may be eliminated from the latter by repeatedly agitating with the concentrated acid at the ordinary temperature. A more convenient way of freeing benzene from thiophene consists in boiling it for some time with anhydrous aluminum chloride. Pure benzene is a light, colorless liquid, having a peculiar odor and a burning taste. At low temperatures it solidifies, forming colorless crystals that melt at $6^\circ C$ and boil at $80.5^\circ C$. The vapors burn with a smoky flame, owing mainly to the high percentage of carbon contained in benzene. Benzene floats on water, but mixes readily with ether, anhydrous alcohol, petroleum, and many other organic liquids. When treated with strong nitric acid, it is converted into nitrobenzene.



The French chemist Berthelot succeeded in converting acetylene gas into benzene by heating the former at a dull-red heat, the conversion taking place according to the following simple chemical equation



As acetylene (q v) can be made directly from carbon and hydrogen, it may be said that ben-

zene, too, can be made from its elements. For an account of the chemical constitution of benzene and its derivatives, see CARBON COMPOUNDS.

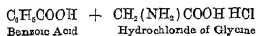
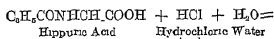
BENZER/TA See BIZERTA

BENZIDINE, $\text{H}_2\text{N}-\text{C}_6\text{H}_4-\text{C}_6\text{H}_4-\text{NH}_2$. A valuable organic substance derived from benzene. In the pure state it forms crystals that melt at 123°C . Benzdine and its derivatives are now used in making many beautiful coloring substances, including the well-known *Congo red* and the *benzopurpurins*. The dyes have the remarkable property of combining with cotton without the aid of mordants and are at present manufactured in very large quantities.

BENZINE (for derivation see Benzene)
One of the products of the fractional distillation of crude petroleum. It is a mixture of volatile hydrocarbons of the marsh-gas series, containing chiefly hydrocarbons that are represented by the two formulae, C_4H_{10} and C_5H_{12} . It is often used as a cleaning fluid for household purposes as well as for removing ink from printing presses. It is a very good solvent for fats, gums, and resin, and is employed in making many varnishes. It also finds employment for enriching coal gas and for certain other purposes. At ordinary temperatures it is a limpid, colorless liquid, much lighter than water, with which it does not mix, and readily catching fire. It boils between the temperatures of 70° and 90° C. (158° and 194° F.), its vapor forming with air a highly explosive mixture. It should not be confounded with the much more important substance called benzene (qv) that is obtained as a product of the fractional distillation of coal tar. See also PETROLEUM.

BENZOATE OF SODA, SODIUM BENZOATE, has replaced salicylate of soda as a preservative agent in food products. While the Federal government allows the use of this substance in quantity not greater than one-tenth of 1 per cent, it is gradually going out of use among the best packers of food products. The few firms that still use this or some other form of preservative claim that it is added simply to protect their goods against careless handling in the household. At the same time preservatives will protect these goods against decomposition resulting from poor manipulation in processing or slight air leaks in packages. See ADULTERATION

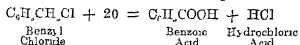
BENZOIC ACID (for derivation, see BENZOIN), C_6H_5COOH . An organic substance used in medicine and the arts and largely for scientific purposes. It may be manufactured by one of the following three methods (1) From benzoil, by subliming or boiling the gum with caustic soda solution (2) From the urine of herbivorous animals, by evaporating to a small bulk, filtering and adding hydrochloric acid to acid reaction, on standing, crystals of hippuric acid separate out, these crystals are transformed into benzoic acid by boiling with strong hydrochloric acid, the hydrochloride of amido-acetic acid (glycine) being formed at the same time, according to the following equation



Finally, (3) benzoic acid may be made from benzyl chloride by oxidizing the latter with

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nitric acid, the transformation taking place according to the following chemical equation



The crude benzoic acid obtained by one of these methods may be purified by recrystallization from water. The pure acid melts at 120° C and boils at 250° C. It readily sublimates, however, long before melting. Though but sparingly soluble in cold water, it dissolves readily in hot water, as well as in alcohol, ether, and other organic liquids.

The acid employed for medicinal purposes is obtained exclusively by subliming gum benzoin and retains the balsamic odor of the gum. When introduced into the body, it is converted (probably in the kidneys) into hippuric acid, which appears in the urine, of course increasing its acidity. For this reason benzoic acid, or its salts, are administered whenever the urine undergoes alkaline decomposition—for instance, in cystitis and pyelitis. Benzoic acid is also used as a disinfecting expectorant in phthisis and bronchitis, when the expectoration is foul

In the arts, benzoic acid is employed in making the dyes known as aniline blue, anthracene brown, etc.

Among the *benzoates*, or salts of benzoic acid, may be mentioned the benzoate of ammonium and the benzoate of sodium, both of which are used in medicine. They are prepared by adding benzoic acid, respectively, to solutions of ammonia and of sodium carbonate. These benzoates are much more readily soluble in cold water than the free acid.

Benzoic acid has been known since the beginning of the seventeenth century. In 1824 Wohler discovered the relationship between benzoic and hippuric acids, and in 1832 Liebig and Wohler determined the true chemical composition of benzoic acid and established its relation to the other benzoyl compounds.

BENZON (ben-zoin) **GUM**, or **GUM BENJAMIN** (earlier *benjoin*, *Fr benjoin*, Ger *Benzoe Sp bewit*, from Ar *lubān-jāwa*, incense of Java, which is the Arabic name for Sumatra, as the syllable *lu* was lost though mistaking it for the Arabic definite article *al*, *el*). A fragrant resinous substance, the dry juice of a large tree, *Styax benjoin*, a native of Sumatra and Java. The tree was introduced into Siam and other places in the East, and the finest gum to be found in the market comes from Siam. Gum benjoin yields a pleasant odor when burned, and is used as incense in the Roman and Greek churches, very large quantities of it are used for a similar purpose in the East. It is used, to some extent, in perfumery, and is sometimes administered medicinally, owing to its properties as a stimulant and emetic, as a good antiseptic it is one of the ingredients of court-plaster. Druggists sometimes add a little benjoin to pomade, to prevent the fat of the latter from becoming rancid. A little of the tincture of gum benjoin added to washes imparts to them a milk-white color and an odor resembling that of vanilla. Benjoin comes to us in reddish-yellow transparent pieces. It is obtained by making longitudinal or oblique incisions in the stem of the tree, the liquid which exudes soon hardening by exposure to the sun and air. Different products, the quality of which depends mainly on the age of the trees from which they

are obtained, differ considerably in price. The gum yielded by trees from 5 to 8 years old is supposed to be of the finest quality, it is almost white and possesses a particularly strong odor. The gum of trees 16 to 18 years old is almost worthless. Chemically, gum benzoïn is a mixture of three different resinous substances soluble in alcohol and alkalies, it contains, besides, a considerable quantity of benzoic acid and often some cinnamic acid.

BENZOIN ODORIFERUM See **FEVER BUSH**

BENZOL See **BENZENE**

BENZOYL, bē'zōil, C_6H_5CO An organic radical, i. e., a group of atoms that forms part of the molecules of many compounds, but cannot exist independently.

BEOTHUK, bē'ō-thuk An extinct tribe formerly inhabiting the interior of Newfoundland. The name is of Micmac origin and is said to signify "red people," in allusion to their custom of painting their bodies with red ochre. They were called "Red Indians" by the white settlers. They lived in very large teepees covered with bark or skins and built a peculiar, crescent-shaped canoe. Owing to their implacable hostility to the whites, they were hunted down like wild beasts until about 1820, when a handful of survivors crossed the straits and found a hiding place in the frozen wilds of Labrador, where some of their descendants may still exist. From an investigation of the few words of their language that have been preserved, Gatschet comes to the conclusion that they constituted a distinct stock. In 1911 Prof. F. G. Speck found an old woman, claiming Beothuk descent, from whom he obtained a few words suggesting the Algonquin stock, however, the data are not decisive.

BEOTHY, bē'ē-thi, **ZOLTÁN** (1848-) An Hungarian novelist and writer on aesthetics. He was born in Komorn, Sept. 4, 1848, and in 1882 became professor of aesthetics in the University of Budapest. His novels, praised for their realistic treatment and clever analysis of character, include *Bezdelyek* (short stories, 1871), *A nyelvelenek*, *Kálódró Béla* (1875), *Rajzok* (sketches, 1879). A collection of his critical and dramatic essays appeared in Budapest in 1881. He is also author of a history of Hungarian literature (*A magyar irodalom története*, 1877, new illus. ed., 1899-1900), an important work upon tragedy (*A tragikum*, 1885), and a history of Hungarian prose fiction (*A szépirodalom elbocsátása*, 1886).

BEOWULF, bē'ō-wulf An Old English poem, epic in theme and in tone, and one of the most interesting literary monuments of the Germanic race. The unique MS. of the poem, now in the British Museum, is usually assigned to the tenth century. The composition of the poem, in its present form, is placed as early as the eighth century, but it is based upon poetry of a period when the Anglo-Saxons were still on the Continent. The scene is Denmark, apparently Zealand, and the opposite coast of Sweden. The monster Grendel—half man, half fiend—comes every night from the fens into the splendid hall of Hrothgar, King of the Danes, and carries off to his subterranean dwelling a number of the King's thegns and devours them. Beowulf, a prince among the Geats (of south Sweden), hearing of this, crosses the sea with 14 companions to rid Hrothgar of the sea fiend. In a mighty struggle in the hall at night Beowulf

performs his exploit. Grendel, after having an aim wrenched from the socket, flees to the fens to die. The next night Grendel's mother comes to the hall to avenge the death of her son and bears away one of Hrothgar's counselors. Beowulf, who is absent, is sent for in the morning. He descends to the caves of the sea, and slays the water demon with a sword wrought by the giants. Beowulf returns to his country, where he becomes King and rules for 50 years. Then a dragon, having been robbed of a cup from an immense hoard which he had guarded for 300 years, becomes enraged and devastates the land. Beowulf, though weakened by his great age, puts the dragon to death with the aid of a kinsman. But, severely wounded, he dies after viewing the treasures. Besides these three adventures, there are several episodes, and throughout graphic scenes of the social life of our ancestors before they left their ancient homes for Britain.

Bibliography The literature on *Beowulf* is most extensive. For an account of the poem, with bibliographies of editions and dissertations and other articles upon it, consult Morley, *English Writers*, vol. 1 (London, 1887), *Beowulf*, translated by Gairnet (Boston, 1885), later translations—those of J. Earle (Oxford, 1892), W. Morris (1898), J. L. Hall (Boston, 1892, 1900), C. G. Child (New York, 1904), Ten Brink, *Early English Literature*, translated by Kennedy (New York, 1883), *Beowulf*, translated into English prose by C. B. Tinker (New York, 1902). For text, consult a facsimile of the MS, with transliteration and notes by Zupitza, made for the Early English Text Society (London, 1882). For editions of *Beowulf* consult Thorpe (London, 1875), Arnold (London, 1876), Wulker-Grein, *Bibliothek der Angelsächsischen Poesie*, vol. 1 (London, 1883), Wyatt (Cambridge, 1898), also edition by F. Holthausen (Heidelberg, 1906), Lang, *English Literature from Beowulf to Swinburne* (London, 1912). The editions by Thorpe and Arnold contain translations. See **ENGLISH LITERATURE**.

BEPPPO. A satirical poem on Venetian social life, by Lord Byron, published in 1818.

BEPPU, bē'p'pū A small seaport and celebrated sea-bathing and health resort, situated on the northeastern coast of the island of Kjusiu, Japan, 7 miles by rail from Oita (Map Japan, B 7). It is celebrated for its hot baths of alkaline water, whose temperatures range from 100° to 132° F. There is here a sanitarium for consumptive railway employees. The place is also a port of call for steamers.

BEQUEATH, bē-kwēn' (*AS* *beocwīpan*, to say, affirm, leave by will, from *prei* bē + *cwēpan*, to say, of Eng. *quoth*). To leave personal property by will or testament to another, the gift so made being known as a bequest, or legacy (qv.). In the law of real property, the corresponding term is *devise*, but the two expressions are in practice used interchangeably, and in English and American law with similar effect. In the Scotch law the terms "bequeath" and "bequest" are appropriate only to personal estate and will not operate as a gift of real property. See **WILL**.

BEQUEST See **BEQUEATH**

BERANE, bē-ra'nē A town of Turkey in the vilayet of Kosova, about 60 miles north of Scutari. It is on the Lim River and near the border of Montenegro (Map Turkey in Europe, B 3). A massacre of Serbs by the Turks in this and neighboring villages in 1912 was re-

sented by the Montenegrins, and the district was the scene of considerable fighting during the Balkan War. Berane was stormed by the northern army of Montenegro and was occupied by them Oct 16, 1912.

BÉRANGER, ba'ran'zhá', PIERRE JEAN DE (1780-1857). A popular French lyric poet of Royalist parents and Republican principles. He was born in Paris. Neglected in childhood, he watched from a roof the storming of the Bastille and imbibed Republican prejudices from an aunt at Peronne, where he became president of a boys' Republican club. He helped his father in business until bankruptcy and was for a time reduced to great straits. The patronage of Lucien Bonaparte relieved him in 1804 and procured for him a clerkship in the university. Gratitude was thus joined to admiration for Napoleon, though he gently satirized the despotic Emperor in his *Roi d'Yvetot* ('King of Yvetot,' 1813), a song that first made Beranger popular. His earliest collection of songs (1815) cost him his clerkship for its liberalism and praise of Napoleon, but earned him distinction. A second collection (1821) brought fame, imprisonment, and a fine. A third collection appeared in 1825, and a fourth in 1828, for which he was fined 10,000 francs, which sum was paid by eager friends. He was also imprisoned for nine months, only to find his cell a reception room for the most eminent men of the time. Two years later the Bourbons fell, but, rejecting the honors proffered by the Orleanists, Beranger retired to Passy, published a fifth collection of songs in 1833, and nothing further. He accepted the honor of an election to the Constituent Assembly of the Second Republic, took his seat, but immediately resigned it. Honors from the Second Empire he steadfastly refused. He died July 16, 1857, and was buried at public cost and with great distinction. Béranger was a worthy man, a good patriot, and eminently the poet of the masses. He continues the song writing of the eighteenth century in his Gallic mocking spirit, but, on the other hand, he is a thoroughgoing democrat whose belief in the wisdom of the majority is his creed. A volume of poems written between 1834 and 1851 appeared as *Deuxième Chansons* ('Last Songs') after his death, also an autobiography (*Ma biographie*, 1858). *A Vie de Béranger* was written and his *Correspondance* edited by Paul Boiteau (5 vols., 1860-61), Jules Janin, *Béranger et son temps* (1866), is also useful. Consult also *Sainte-Beuve, Portraits contemporains*, 1, Brunetiere, *Poésie lyrique* (Paris, 1894), Peyrat, *Béranger et Lamennais* (1861), Nivalet, *Souvenirs historiques et étude analytique sur Béranger et son oeuvre* (Paris, 1892), *Les chansons de Béranger, morceaux choisis*; preface de Comte Berge Fleury (Noel Ramère) (New York, 1911).

BÉRAB, bá-rá', or the HYDERABAD ASSIGNED DISTRICTS. A commissionership of British India, lying to the north of the Nizam's dominions (Map India, C 4). It lies between lat 16° 20' and 21° 40' N., and between long 76° and 78° 2' E. Area, 17,710 square miles. Pop., 1891, 2,897,491. 1901, 2,754,016. 1911, 3,057,162. It is well watered by tributaries of the Tapti and Godavari. The soil is peculiarly suitable to the cultivation of cotton, although millet and wheat are important products. The only manufactures of importance are in connection with the cotton industry. Berar came under British

administration in 1853 and was "assigned" to the British to maintain a force called the Nizam's contingent." The arrangement continued until 1902, when Berar was leased to the British in perpetuity, and it is now attached to the Central Provinces for administrative purposes. Capital, Ellichpur.

BÉRARD, bá-rá', JOSEPH FRÉDÉRIC (1789-1828). A French physician and writer on physiology. He was educated at Montpellier and was employed in Paris on the *Dictionnaire des sciences médicales*. He was professor of hygiene in Montpellier, where he died at the age of 39. His most important work is *Doctrines des rapports du physique et du moral pour servir de fondement à la physiologie dite "intellectuelle" et à la métaphysique* (1823), in which he holds that the manifestations of will and of instinct cannot all be attributed to a single active cause, the "vital principle" of Barthez (qv). From the different phenomena of life he infers the existence of a purely spiritual substance—a soul—besides the principle of life, the two coexisting and exercising constant reciprocal action in the living and thinking being.

BERAT, bá-rat' (corrupted from Slav *Belgrad*, white fort). A fortified town in the principality of Albania, situated on the banks of the Ergene or Osum, about 30 miles northeast of the seaport of Valona (Map Turkey in Europe, B 4). The valley in which Berat stands is very fertile, producing large quantities of grain, oil, and wine. The town is picturesque and contains several quaint churches and mosques. Pop., about 15,000, including 5000 Greeks.

BER/BER (evidently from Gk *βάρβαρος*, *bar-ba-ros*, stammering, uncivilized, of which the *Ar Ratana* or *Ertana* is an equivalent, *Amazurg*, 'the free,' is the native name). A name applied to the early Hamite peoples of northern Africa and the Sahara west of Egypt. They are called Tuaregs in the desert, Shilluhs (Shilluhs) in Morocco, Kabyles in Algeria and Tunis, and Amazurg or Mazys in their own speech. They have been mixed with negro peoples in some places, in others with Semites, as well as with Romans, Vandals, and later Europeans, to whom they are closely akin. Their color varies from that of the blonde descendants of the fair Libyans of the monuments to very dark, their stature also varies from tribe to tribe, the Mzabite Berber averaging 1.620 m., those of Tunis 1.663 m., of Biskra, 1.663 m., of Algeria 1.680 m., the cephalic index is 77.3. They are agriculturists and herdsmen and live in tents, adobe huts, or stone houses, according to locality. In textile, leather, and metal work they excel, though their mechanical appliances are antiquated. Their government is patriarchal.

BÉRBER, El MEKHEB, or El MESHREIF. A town in upper Nubia on the east bank of the Nile, a short distance below the confluence of the Atbara, about lat 18° N., long 34° E. (Map Egypt, C 4). It was one of the main stations on the direct route from Khartoum to Cairo, and a starting place for caravans going to Suakin, on the eastern coast, and is still of commercial importance, but the opening of a railway line in 1906 to take the place of the caravan route has diverted much of the Red Sea trade elsewhere. Pop., estimated between 6000 and 10,000.

BER/BERA. The chief seaport of British Somaliland, situated on the Gulf of Aden, about 170 miles south of Aden (Map Egypt, E 5).

The town has a sheltered harbor and is the scene of an annual fair, lasting for some months, during which the population of the town is greatly increased and an extensive trade in coffee, gold dust, ostrich feathers, skins, ivory, cattle, etc., is carried on. The climate is healthful and the surrounding country very fertile. The population varies with periods of trade activity from 10,000 to about 30,000.

BERBERIDACEÆ A family of dicotyledonous plants, of which the different species of barberry (q.v.) afford the best-known examples. Many of the plants of this order are spiny shrubs, some are perennial herbaceous plants. Their leaves are alternate, often with dilated bases or stipules, their flowers sometimes solitary, sometimes in racemes or panicles. The calyx consists of three, four, or six deciduous sepals, the corolla, which arises from beneath the ovary, consists of petals either equal in number to the sepals and opposite to them, or twice as numerous, the stamens are usually equal in number to the petals and opposite to them, the anthers are two-celled, each cell opening by a valve which curves back from bottom to top, except in *Podophyllum*, in which the anthers split lengthwise, the carpel is solitary and one-celled, the fruit is either a berry or a capsule. The family contains 20 genera and about 200 species, chiefly belonging to the temperate parts of the northern hemisphere and of South America. The principal genus is *Berberis*, which includes about 100 species. The common American representatives are *Podophyllum* (May apple or mandrake), *Jeffersonia* (twinleaf), *Caulophyllum* (blue cohosh), and *Berberis* (barberry).

BERBERINE, bër'bër in. See BARBARA.

BERBERINI. See ALKALOIDS.

BERBERIS. See BARBERRY.

BERBICE, bër-bës'. The eastern division of British Guiana (Map Guiana, F 3). The capital, Berbice, or New Amsterdam, is situated on the estuary of the Berbice River, has a population of about 10,000, and is an important commercial centre. Its citadel, Fort York, and numerous intersecting canals, give it the aspect of a mediæval Dutch town. See GUIANA.

BERCEO, GONZALO DE. See GONZALO DE BERCEO.

BERCEUSE, bär'séz (Fr. cradle song). A lullaby, a cradle song, a vocal or instrumental piece of music with a soft and swinging melody. The German equivalents are *Wiegenlied* and *Schlummerlied*. Chopin's *Opus 57* is a most beautiful berceuse. The name may be applied also to some of the cradle songs familiar in England and the United States, such as "Sleep, Baby, Sleep," and "Sweet and Low."

BERCHEM, bër'çem. A fortified suburb of Antwerp, Belgium, with a population, in 1900, of 22,000. 1904, 26,383. 1910, 30,274.

BERCHEM or **BERGHEM**, CLAES (NICOLAËS) PIETERZ (1620-83). A Dutch landscape painter. He was born at Haarlem, the son of Pieter Claesz (the origin of the name Berchem, by which he is generally known, is uncertain). Of the four painters under whom he is said to have studied only Claes Mojaert of Amsterdam exercised a perceptible influence upon his work. This is evident in his earliest landscapes, in which the figures represent religious subjects. But by far the most of his paintings are Italian landscapes with shepherds as figures. From these as well as from a well-founded tradition,

it seems certain that he visited Italy before 1642, in which year he entered the Haarlem Guild. He practiced chiefly in Haarlem, but also in Amsterdam, to which city he removed in 1677. He excelled especially in sunny atmospheric effects, but continued reputation caused his paintings to degenerate into mannerism. They are found in all the principal public and most of the private collections of Europe. His etchings, of which about 50 survive, show unsurpassed ability for rendering sunshine.

BERCHET, bë'shà', GIOVANNI (1783-1951). An Italian patriotic poet and one of the leaders of the Romantic school in Italy. Born in Milan, a centre of aggressive liberalism in the first years of the century, Berchet won some recognition with a translation of the "Bard" of T. Gray (1807), of ballads from Goldsmith's *Vicar of Wakefield* (1808), and other poems. But he achieved fame in 1816 with his *Lettera semiseria di Grisostomo*, in which, as a commentary on his prose translations of the famous ballads of Burger, "Eleanora" and "The Wild Chase," and as a contribution to the polemic around Madame de Staël's attack on Italy, he defined the notions of the Italian Romantics on aesthetics. Here he was one of the first aestheticians to systematize the theories of the unity of substance and form, the artificiality of literary genres, the inadequacy of rules as the test of art, the idea that art is as limitless as nature, and that the prerequisite of æsthetic judgment is the penetration into the mental state and intention of the artist. The organ of Berchet and his friends was the biweekly *Conciliatore* (1816-19). The political tendencies of the journal led to its suppression, and the persecutions of the liberals of 1821 sent Berchet into exile, where, till 1847, he lived alternately in England, France, and Germany. From Paris (1823) he hurled his fiery ballad "I profughi di Parga" against the cession of Parga by England to the Turks. In London (1824-26) he published, in application of his theory that poetry must be of popular inspiration, his *Poesie*, of which the most celebrated ballad is "The Hermit of Mont Cenis." In 1820 came the patriotic "Fantasia." To his struggling compatriots in 1831 he sent the poem "All'armi, all'armi," dear to every soldier of the revolution. His most extensive collection of ballads, *Vecchie romanze spagnuole*, was published in Bruxelles in 1837. The high estimate of Berchet's poetical production made by De Sanctis (*Storia della lett. ital. nel secolo XIX.*), defended by B. Croce (*Critica*, 1910), has been offset by a general inclination to depreciate him. It must be admitted that his patriotic verse, while appealing to emotions of struggles now past, admirably fulfilled its purpose. His ballads contain at least one acknowledged gem and, though overshadowed by Manzoni's work, helped toward that enlargement of the artistic vision of Italy, for which the Romantics fought. In 1848 Berchet returned to Italy, took an active part in the revolution of that year, and was appointed Minister of Public Instruction by the provisional government of Milan. After the suppression of the revolution he retired to Turin and was at the time of his death, in 1851, a member of the Sardinian parliament. The best edition of his writings is the *Opere*, edited by E. Bellorini (Bari, 1911-12). For the biography, consult Cusani's introduction (Milano, Pirotta, 1863), G. Mazzoni, *Glorie e memorie* (Firenze, 1906), and the arti-

cles of E Bellorini in *Giornale storico della lett ital* (1910-12)

BERCHOUX, bër'shou', JOSEPH (1765-1839) A French poet, born at Lavi-Saint-Symphorien (Loire). His first work was a satire, *Les Grecs et les Romains* (1797), but it is as the author of *Gastonomie* (1800) that he is best known. Portions of this book have passed into proverbs and have given its author the reputation of a gourmet, which, it is said, was undeserved.

BERCHTA, bër'k'ta or **PERCHTA** (according to E Mogk, in Paul's *Grundriss der germanischen Philologie*, vol iii, p 278, from Goth. *Laugan*, OHG *beigan*, Old Eng *beorgan*, Mod HG *bergen*, to conceal, cover, protect) In German mythology, the name given in the south of Germany and in Switzerland to a spiritual being, who was apparently the same as the Hulda (whose name is itself derived from OHG *helan*, to hide, whence Eng *hell*, Mod Ger *Hölle*) of northern Germany. This being represented originally one of the kindly and benign aspects of the unseen powers, and so the traditions of Hulda (qv) in the north continued to represent her. But the Berchta of the South, in the course of time, became rather an object of terror, and a bugbear to frighten children, the difference probably arising from the circumstance that the influence of Christianity in converting the pagan deities into demons was sooner felt in the South than in the North. Lady Berchta has the oversight of spinners. The last day of the year is sacred to her, and if she finds any flax left on the distaff that day, she spoils it. Her festival is kept with a prescribed kind of meagre fare—oatmeal gruel, or pottage, and fish. If she catches any persons eating other food on that day, she cuts them open, fills their paunches with chopped straw and other such agreeable stuffing, and then sews up the wound with a plowshare for a needle and an iron chain for a thread. In some places she is the queen of the crickets. She is represented as having a long iron nose and an immensely large foot. That she was once an object of worship is testified by the numerous springs, etc, that bear her name in Salzburg and elsewhere. It is likely that many of the sagas of Berchta were transferred to the famous Berthas of history and fable. The numerous stories of the "White Lady" who appears in noble houses at night, rocks and nurses the children while the nurses are asleep, and acts as the guardian angel of the race, have doubtless their root in the ancient heathen goddess Berchta.

BERCHTESGADEN, bër'k'tes-ga'den. A government district of Upper Bavaria, in the southeastern corner of the kingdom. Its area is 154 square miles. It has a rocky, mountainous surface, is noted as one of the most picturesque portions of the Bavarian Alps, and is a favorite tourists' resort. There are a number of mountain lakes, among which the Königssee is the best known. The district is rich in salt, marble, and wood, and the exploitation of these natural resources and wood carving and cattle raising constitute the chief occupations. The chief settlement is the village of Berchtesgaden, situated a short distance from the Königssee, pop, 1900, 2634, 1910, 2928, mostly Roman Catholics. It has two churches of interesting architecture and a royal castle. Berchtesgaden constituted an ecclesiastical principality of the old German Empire, which was secularized in 1803.

BERCHTOLD, bër'k'tolt, LEOPOLD ANTHONY

JOHANN SIGMUND, COUNT VON (1863—) An Austro-Hungarian statesman, born in Vienna. He entered the diplomatic service at an early age and in 1895 was appointed secretary of the Austrian Embassy in Paris. In 1899 he became counselor of the Embassy in London and in 1903 was appointed to the same position at St Petersburg. Three years later he received the appointment of ambassador at St Petersburg. In 1912 he was appointed foreign minister of the Dual Monarchy, to succeed Count von Aehrenthal. See AUSTRIA HUNGARY, History.

BERCK, bër'k, A fishing village of the department of Pas-de-Calais, France, on the English Channel, 28 miles south of Boulogne. A mile distant is Berck Plage, a summer bathing resort. This latter has a fine sandy beach, a kusaal, and two hospitals for children. Pop, 1896, 7039, 1901, 7799, 1906, 9636, 1911, 11,597.

BERCKHEYDE, bër'k'hē'de, GERRIT (1638-98) and JOB (1630-93), Dutch painters of landscape, architectural, and genre subjects—GERRIT, the elder and more important of the two, studied with Jacob Dewet, but not under Frans Hals, as has been assumed. Accompanied by his younger brother, he traveled all along the Rhine, practicing especially at Cologne and Heidelberg, where the Elector held him in high honor. In 1654 he was admitted to the Guild of Haarlem, in which city he lived and worked with his brother until his death. His architectural subjects are the very best of their kind, and he is also considered one of the best genre painters of Holland. Among his favorite architectural subjects are the Bourse of Amsterdam (Museums of Amsterdam, Rotterdam, Frankfurt, Brussels), and the church of St. Bavon in Haarlem (Dresden, Haarlem). Good examples of his genre pictures are "At Breakfast" (Schwerin), "Soldiers on Guard" (Dessau), and "A Courtier's Room" (Rotterdam)—JOB, his younger brother and pupil, was more prolific but also more restricted in subject, confining himself mostly to oft-repeated views of the streets and public places of cities. Although he was far more popular than his brother, and contemporary poets sang his praises, he was a less able artist, failing particularly in the treatment of light.

BERDIANSK, bër-dyansk' (from the river Berdyanka, near the mouth of which it is situated). A seaport in the Russian government of Taurida, situated on the north shore of the Sea of Azov (Map Russia, E 5). It has a good harbor and exports grain, wool, hides, fish, and salt. This town is the centre of a district in which the manufacture of agricultural implements and machines is extensively carried on. There are three churches, a gymnasium, and a seminary for teachers. Pop, 1897, 27,247, 1900, 29,000.

BERDITCHEV, bër-dyě'chēf. The capital of a district in the government of Kiev, Russia, about 180 miles southwest of Kiev (Map Russia, C 5). It is famous for its four annual fairs. At these, cattle, corn, country produce, carriages, and harness are sold in large quantities. The principal manufactures include tobacco, oil products, and leather. The population in 1897 was 53,700, including many Jews. It advanced to 76,896 in 1910. The town is the private property of Count Tishkevitch, which fact is proclaimed by an inscription on a single over the city gate. The ground is leased to the

owners of the buildings. It was in 1320 that the Grand Prince of Lithuania, Gedimin, made a gift of Berditchev, then an insignificant settlement, to the Tishkevitchs, and it has remained the patrimony of the counts till the present day. At the close of the sixteenth century Yanush Tishkevitch, the waywode of Kiev, built a castle here, to which he added a monastery in 1627. This was surrounded soon with strong walls and a moat as a protection against the frequent invasions of the Tatars and Cossacks. In 1647 Khmelnitsky successfully stormed Berditchev and robbed the monastery. The town figures prominently in subsequent conflicts between the Poles, the Cossacks, and the Russians.

BEREA. A town in Madison Co., Ky., 53 miles by rail south by east of Lexington, on the Louisville and Nashville Railroad (Map Kentucky, F 4). It is the seat of Berea College (q.v.). It contains also a college chapel, erected by the students, a Carnegie library and a stove factory. The water works, ice, and electric light plants are owned by the college. Pop., 1910, 1510.

BEREA. A village in Cuyahoga Co., Ohio, 12 miles southwest of Cleveland, on the Cleveland, Cincinnati, Chicago, and St. Louis, the Lake Shore and Michigan Southern, and the Cleveland, Lorain, and Wheeling (Baltimore and Ohio system) railroads (Map Ohio, G 3). It is the seat of Baldwin University (Methodist Episcopal), opened in 1846, and of German Wallace College (Methodist Episcopal), established in 1864, and contains the German Orphan Asylum (Methodist Episcopal). Stone quarrying and the manufacture of grindstones, pumps, nuts and bolts, topeodes, and foundry products are the chief industries. The village owns its water works and electric light plant. Pop., 1910, 2609.

BEREA. See **BEREFA**.

BEREA COLLEGE. A coeducational institution at Berea, Ky., in the edge of the Cumberland Mountains, organized as a school in 1855. Its great distinction has been in discovering the need and worth of the people of the southern mountains and in adapting educational methods to the extreme rural conditions of this vast region, to which it has given the name "Appalachian America." The institution embraces a college of standard rank, a normal school, an academy, a group of vocational schools, and a foundation school, the combined faculties with executive officers numbering 87. The students come chiefly from the mountain sections of Kentucky, Tennessee, North Carolina, and the Virginias, numbering, in 1913, 1430 (104 collegiate, 310 normal), besides 306 pupils in the model schools. An extension service of traveling libraries and lectures and industrial exhibits is also maintained. Berea is a religious school, exempt from sectarian control. It has an educational plant, buildings, forest reserve, etc., valued at \$650,000, and an endowment of approximately \$1,000,000. The library numbers 26,000 volumes. The students can pay only small fees, and the extension service is almost wholly gratuitous, so that from \$50,000 to \$75,000 has to be raised each year to carry on the work. From 1867 colored teachers also were trained at Berea. This was interdicted by state law in 1904 and the work transferred to an independent school, the Lincoln Institute of Kentucky, near Shelbyville.

BEREA GRIT. See **STONE**.

BERE'ANS. An almost extinct sect of

Christians, who originated in Scotland in the eighteenth century. Their name is derived from their claim to imitate the Bereans (Acts xvii 11) in accepting only the Bible as authority. The founder of the Bereans was the Rev. John Barclay, a native of Perthshire (born 1734, died 1798). From him they also received the name of Barclayans. They believe that the knowledge of God's existence and character is derived from the Bible alone, and not from reason or nature, that the Psalms of David do not relate to David at all, but exclusively to Christ, that assurance is of the essence of faith, and that unbelief is the unpardonable sin. In the ordinary points of doctrine they are Calvinistic. See **BARCLAY**, JOHN.

BEREK-BOSZORMENY. See **BOSZORMENY**.

BERENDT, b'ä'rent, KARL HERMANN (1817-78). A German ethnologist. He was born in Dantzig, studied medicine, taking his degree at Königsberg, and in 1843 settled as a practicing physician at Breslau, where he also lectured at the university. In 1851 he came to America, his political attitude during the preceding revolutionary period having rendered his stay in the fatherland undesirable. He went first to Nicaragua, where he devoted himself to the study of ethnography and natural history, and then, from 1855 to 1862, lived at Vera Cruz, in Mexico. Retiring from the practice of medicine, he devoted himself entirely to scholarly pursuits and made a special study of the ethnology and linguistics of the Mayan tribes. In 1863 he came to the United States and soon afterward made a journey to Yucatan, at the request of the Smithsonian Institution, which published the results of his investigations in its report for 1867. Two years later he was in Tabasco, Mexico, searching the ruins of Ceutla, and in 1874 went to Guatemala and settled at Coban, where his time was divided between the study of the Mayan dialects and the raising of tobacco. Besides numerous contributions to scientific periodicals, he published, among other works, *Analytical Alphabet of the Mexican and Central American Languages* (1860), *Los escritos de Don Joaquín García Icazbalceta* (1870), *Los trabajos lingüísticos de Don Pro Pérez* (1871), *Cartilla en lengua Maya* (1871), *Los indígenas de la América central y sus idiomas* (1878).

BERENGAR, b'ä'ren-gär, I (?-924). King of the Lombards from 888, and Roman Emperor after 915. He was originally Margrave of Friuli, and on the death of Charles the Fat (q.v.), in 888, he was crowned King of the Lombards. In the following year, however, he was defeated by Guido, Duke of Spoleto, who succeeded him as King. On the death of Lambert, son of Guido, in 898, Berengar was restored to his title, and in 915 he was crowned Emperor. Throughout his reign the nobles of Tuscany and Spoleto were opposed to him and summoned to them aid northern princes who aspired to the imperial dignity. In despair, Berengar called in the dreaded Hungarians, and for this act, probably, he was assassinated in 924. Consult Gregorovius, *Rome in the Middle Ages*, vol. II (London, 1895).

BERENGAR II (?-966). The grandson of Berengar I and King of Italy after 950. His enemies summoned to their aid Otto I of Germany, and Berengar was obliged to become his vassal. After the death of Albeic, the ruler of Spoleto and patrician of the Romans, Berengar became very powerful. Again his enemies summoned Otto. Berengar was dethroned in 961.

and imprisoned at Bamberg, where he died in 966

BERENGARIA, ba'rên-ga'ri-a (?-c 1230) The Queen of Richard the Lion-hearted, King of England. She was the daughter of Sancho VI of Navarre and was betrothed to Richard soon after his succession to the throne, joining him in March, 1191, at Reggio in southern Italy, where the English King had arrived on his way to the Holy Land. She was married to him on May 12 at Limasol in Cyprus and accompanied him to Acre, where the Queen remained while Richard was carrying on his campaigns against the Saracens. The English sailed from Acre in October, 1192. While Richard was a prisoner in Germany, Berengaria took up her residence in Poitou. After Richard's release from captivity an estrangement arose between him and Berengaria, and it is doubtful whether she ever rejoined the King. She died at Le Mans, in Maine, soon after 1230, and was buried in the church of Pietas Dei at Espan, which she had founded. Berengaria was of remarkable beauty and exceedingly accomplished for her age.

BERENGARIUS OF TOURS, tūr (c 1000-1088). A French scholastic theologian. He was born at Tours and became a canon there. About 1040 he became preceptor of the school of St Martin in Tours, and archdeacon of Angers. Here he continued to deliver his metaphysico-theological prelections and drew upon himself the charge of heresy, in reference to the doctrine of transubstantiation. He held the doctrine of Scotus Erigena, that the bread and wine in the sacrament of the Eucharist remained bread and wine, and that the faith of the believer who recognized their symbols meaning transformed them only subjectively into the body and blood of Christ. This interpretation was condemned by Pope Leo IX (1049-50), and also by King Henry I of France. In 1054 he retracted his opinion before the Council of Tours, but what Berengarius meant by "retraction" it is not easy to see, for he immediately returned to his conviction and recommenced the advocacy of it. For this he was cited to appear at Rome, where he repeatedly abjured his "error," but never seems to have really abandoned it. Hildebrand, who was then Pope, treated him with great moderation, and at last, when he discovered how hopeless it was to bind down Berengarius by abjurations or declarations, he conceived it best to let him alone. Harassed and weakened by the attacks of the orthodox party, headed by Lanfranc of Canterbury, Berengarius finally retired to the Isle of St Cosmos, near Tours, in 1080, where he spent the last years of his life in devotional exercises. He died Jan. 6, 1088. The greater number of his works are lost. Such as are extant have been collected and published by A. F. and F. T. Vischer (Berlin, 1834). Chief is his *De Sacra Cena*. Also in Migne, *Pat. Lat.* CLXXVIII. Cf. H. Sunderdorf, *Berengarius Turonensis oder seine Sammlung ihn betreffender Briefe* (Berlin, 1850). Consult Harnack, *History of Dogma* (Boston, 1895), Gore, *Dissertations on Subjects connected with the Incarnation* (New York, 1895).

BERENICE, bër'è-nî'sè (named in honor of Berenice, Gk. Βερενίκη, *Bereniké*, mother of Ptolemy II). An ancient town of Egypt, situated on a bay of the Red Sea, in about the same latitude as Assuan. It was founded by Ptolemy II, Philadelphus, in 275 B.C., as an emporium for

the trade with Arabia and India. It was still very important in Roman times, as temple ruins bearing the name of Tiberius attest. The modern town is called Sikket Bender el-Kebir, and now, owing to the formation of a sand bar at the entrance of the harbor and the filling up of the harbor itself, the port is practically accessible only to small boats, the valley in which it is situated is called Wady Sakket. The old fortified caravan road of about 10 days' journey through the land of the Bisharin (q.v.) and Abadbe is still traceable. The deserted ancient emerald mines north of Berenice were discovered by Bruce.

BERENICE (Bérnice), the name of five Egyptian and two Jewish princesses. 1 The daughter of Lagos and wife, first of a Macedonian soldier and later of Ptolemy Soter. She had come to Egypt as the attendant to Eurydice, Ptolemy's bride, but her son Ptolemy Philadelphus was made heir over Eurydice's children. 2 The daughter of Ptolemy Philadelphus and wife of Antiochus Theos of Syria. She is referred to in Dan xi 6 ff. 3 The daughter of Magas, King of Cyrene, and wife of Ptolemy III, Euergetes. The name *Coma Berenices* has been given to a certain constellation to commemorate the dedication of her hair while her husband was absent in Syria. The mysterious disappearance of her hair from the temple of Venus, where it was dedicated, led Conon of Samos to say that it had been carried to heaven. 4 The daughter of Ptolemy X. She was murdered by her second husband, Alexander II. 5 The daughter of Ptolemy Auletes and the eldest sister of Cleopatra. 6 The daughter of Salome, sister of Herod I. By Aristobulus she was mother of Herod Agrippa I. 7 The eldest daughter of Herod Agrippa I, sister of Agrippa II, and wife of her uncle, Herod, King of Chalcis. After the death of her husband (48) she married Polemon, King of Cilicia, but soon deserted him and returned to live with her brother. She was accused by court scandal of incest with him, and it was before the pair thus besmirched that Paul made his defense (Acts xiv 23, xxvi 30). Her younger sister, Drusilla, she made unhappy by her petty tyranny. In 68 she attracted the attention of Titus, later the Roman Emperor, who received her when she came to Rome in 75. Their contemplated marriage was, however, so unpopular that Titus gave it up and discarded her (79). Her death was at a time and place unknown.

BERENSON, BERNHARD (1865-) An American writer and art critic. He was born at Wilma, Russia, whence his parents emigrated to the United States. He received his education at the Boston Latin School and at Harvard University, graduating with the degree of A.B. in 1887. He then proceeded to Italy, with the avowed purpose of becoming an authority on Italian painting. In this he succeeded to such an extent that he is now regarded as probably the most eminent authority on the subject, and his attributions of pictures are generally accepted. He took up his residence in Italy at Settignano, near Florence. His principal works, besides many contributions to French, Italian, German, and English art periodicals, are *Venetian Painters of the Renaissance* (1894), *Lorenzo Lotto A Study in Constructive Art Criticism* (1895), *Florentine Painters of the Renaissance* (1896), *Central Italian Painters of the Renaissance* (1897), *Study and Criticism of*

Italian List (1901, 2d series, 1902), *Drawings of Florentine Painters* (1903), his masterpiece, *North Italian Painters of the Renaissance* (1907), *A Siennese Painter of the Franciscan Legend* (1910). Most of his books were published in the United States and have gone through many editions. His wife, MARY LOGAN BERENSON, is also a well-known writer and critic on Italian painting.

BERESFORD, bér'es-fôd, LORD CHARLES WILLIAM DE LA POER (1846-) A British naval officer and parliamentarian, born in the county of Waterford, Ireland. He was educated at private schools and entered the school ship *Britannia* as cadet in 1859. He was made a sublieutenant in 1866, lieutenant in 1868, commander in 1875, captain in 1882, and rear admiral in 1897. In 1896-97 he was aide-de-camp to Queen Victoria. At the bombardment of Alexandria in 1882 he was in command of the gunboat *Condor* and succeeded in silencing one of the most formidable of the Egyptian batteries, under circumstances demanding the utmost skill and bravery. After the bombardment, and during the temporary occupation of the city, he acted as chief of police. In 1884 he served with the Nile column of the Gordon Relief Expedition, and commanded the *Safieh*, whose action, handicapped by a temporarily repaired boiler, saved the entire column. He was in command of the naval brigade at the battles of Abu Klea, Abu Kru, and Metemneh. He served as member of Parliament for Waterford (1874-80), East Maylebone (1885-90), and York (1897-1900), which latter seat he resigned to go into active service. In 1902 he was a member of Parliament for Woolwich, being at that time on the retired list. In 1898 Beresford went to China as the representative of the Associated British Chambers of Commerce, and returned by way of the United States, where he made important speeches advocating the "open-door" policy in China and a closer union of the United States, England, and Germany with regard thereto. He was commander in chief of the Mediterranean fleet in 1905-07, and, with the rank of admiral, of the Channel fleet in 1907-09. He retired owing to friction with the Naval Board. The trouble came to a head through his outspoken criticism of the policy of Sir John (now Lord) Fisher, First Lord of the Admiralty, and of his colleague, Sir Percy Scott. He found vent for his strong views on British naval affairs in his book *The Betrayal* (1912), in which he condemned the shipbuilding policy of Great Britain from 1902 to 1909. At the request of the British government the first edition was withdrawn and its criticisms modified. The publication of this book led to the formation of the British Naval War Staff. Lord Charles took a firm anti-home rule stand on the Ulster question. He was created G.C.V.O. in 1906 and G.C.B. in 1911. His publications include *Life of Nelson and His Times* (London, 1898-1905), *The Break-up of China* (1899), *The Betrayal, being a Record of Facts Concerning Naval Policy and Administration from the year 1902 to the Present Time* (London, 1912), and many minor articles and essays on naval and imperial questions, besides his numerous contributions to the *Times*.

BERESFORD, WILLIAM CARR, VISCOUNT (1768-1854) A British general. He was the natural son of the first Marquis of Waterford,

and was born Oct. 2, 1768. He entered the army in 1785. After serving in India and elsewhere, he bore a conspicuous part in the reconquest of the Cape of Good Hope in 1806, and subsequently, with the rank of brigadier-general, was with the British filibustering force that surprised and took possession of Buenos Aires. The population, however, on seeing the smallness of the force, banded together under the leadership of the French Chevalier de Liniers, and after a desperate resistance made the survivors prisoners of war. After six months' imprisonment Beresford escaped and reached England in 1807. In August, 1808, he joined the British army in Portugal and proceeded into Spain with Sir John Moore's force, was present at the battle of Corunna, and, after covering the embarkation of the troops, returned with them to England. Ordered a second time to Portugal, in February, 1809, to take command of the Portuguese army, he succeeded in improving its discipline so greatly as soon to render it highly efficient for active service. Appointed marshal of Portugal in March, at the head of 12,000 men he attacked the French in the north of that kingdom, crossed the river Douro, drove Loison's division to Amarante, and uniting with the force under Sir Arthur Wellesley, pursued it in its retreat till it was utterly disorganized. For his services at the battle of Busaco, Sept. 27, 1810, Beresford was nominated a Knight of the Bath. He commanded at the bloody battle of Albuera, May 16, 1811, and for the victory there gained over Soult he received the thanks of Parliament. He was present at Badajoz, at Salamanca, where he was severely wounded, and at various engagements in the Pyrenees. In 1814 he distinguished himself at the battle of Toulouse. In 1814 he was created Baron, and in 1823 Viscount, Beresford. He also bore the Spanish title of Duke of Elvas, and the Portuguese, of Conde de Trancoso. He received rich rewards from the British government, and in the Wellington administration (1828-30) he was appointed to the high office of master-general of the ordnance.

BERESINA, bér-vá'zè-nà A river of Russia, tributary of the Dnieper, rising in the northern part of the government of Minsk, in a low, marshy region, near the town of Beresina (Map Russia, E 4). It flows in a southeasterly direction and joins the Dnieper after a course of about 335 miles. It is navigable for the larger part of its course, but its commercial importance has considerably decreased on account of the adjacent railway lines. The Beresina is connected by canal with the Dvina.

The Beresina is memorable for two military passages. The first one was effected by the troops of Charles XII of Sweden in June, 1708, for the purpose of invading Little Russia. The second and the more famous occurred on Nov. 26-29, 1812, during Napoleon's retreat from Moscow. On the 26th and 27th the corps of Oudinot, Ney, a part of the artillery, and the Guards succeeded in crossing the river. On the 28th the Russian artillery began to bombard the bridge, and in the panic which ensued among the crossing troops it is estimated that over 10,000 Frenchmen, many of whom were sick and wounded, were lost, and that about 15,000 were made prisoners.

BERETTA See COSTUME, ECCLESIASTICAL.
BERETTINI, bér'et-tè'nà, PIETRO See CORTONA, PIETRO DA.

BEREZIN, bér'já'zen, ILYA NIKOLAYEVICH (1818-96). A Russian Orientalist and traveler. He was born in the government of Perm and studied Oriental philology at the University of Kazan, receiving in 1841 the degree of master of Oriental philology. In 1846 he was appointed professor at the University of Kazan and after 1848 spent some time in Siberia, where he continued his studies in philology and ethnology. From 1842 to 1845 he held, from the University of Kazan, a fellowship, on which he traveled to Persia, Asiatic Turkey, and Egypt. In 1855 he was appointed extraordinary professor of the Turkish language and literature at the University of St. Petersburg. His more important works (in Russian) include *Library of Oriental Historians* (3 vols., 1849-51), *Tour through Daghestan and Trans-Caucasia* (1850), *A Grammar of the Persian Language* (1853), *The First Mongol Invasion of Russia* (2 vols., 1852), *Popular Turkish Sayings* (1857). In French he wrote *Recherches sur les dialectes Musulmans* (1848-53). He also edited Rashid Ed-Din's *History of the Mongols*, vols. I-III (1858-65), and the *Russian Encyclopedic Dictionary* (16 vols., 1872). He also worked on, but did not complete, a *Turkish Anthology* and a *New Russian Encyclopedic Dictionary* (8 vols.).

BEREVOZ, bér'yá'zof. A district town of the Siberian province of Tobolsk, situated on the Sosva, a branch of the Obi, about 700 miles from Tobolsk. It lies in a rough country, covered with thick forests, and has a severe climate. Among the noted personages exiled to this place in the eighteenth century were Menshikov, who died here in 1729, and Dolgoruk, Pop, 1897, 1073.

BERG, bér'k. A former duchy of Germany, now comprised in Prussian Westphalia, and situated on the Rhine between Cologne and Coblenz. Anciently a countship, it became a duchy in the fourteenth century. By the Treaty of Cleves in 1666 it was placed under the control of Neuburg. Napoleon bestowed the duchy on Murat in 1806, but in 1815 it was ceded to Prussia by the Congress of Vienna.

BERG, FRIEDRICH WILHELM REMBEET, generally known as FEODOR FEODOROVITCH BERG (1793-1874). A Russian field marshal. He was born at the castle of Sagnitz, Livonia. He became a captain in the Russian army after the entry of the Allies into Paris, was advanced to the rank of colonel, and from 1822 to 1824 commanded several expeditions against the Kirghiz tribes. As major general he took a conspicuous part in the Russo-Turkish campaign of 1828-29 and in that against the Poles in 1831. He was successively advanced to the rank of lieutenant general, general of infantry and quartermaster general on the Imperial General Staff. In 1849 he was Minister Plenipotentiary of the Russian government to the court of Austria. During the Crimean War he defended Revel and Esthonia against the Allied fleets, and in 1854, as governor general of Finland and commander in chief of the troops stationed there, he repulsed (August 8-10) a vigorous attack upon Sveaborg. For this service he was elevated to the nobility in 1856. Owing to his strenuous opposition to a liberal policy for Finland, he was compelled, in 1861, to resign his position as governor general of that province, and was transferred in the same capacity to Poland in 1863, where he soon succeeded in quelling the insurrection. He became field marshal in 1865 and in 1872, in com-

memoration of his 60 years' service as an officer, received the medallions of the reigning Czar and his predecessor, set in gems. Berg was for years a member of the Czar's advisory council and president of important military organizations.

BERG, bér'g, JOSEPH FREDERICK (1812-71). A Dutch Reformed clergyman, born at Grace Hill, Antigua, West Indies, June 3, 1812. He was the child of Moravian missionaries, and so was educated by Moravians in England and the United States, to which country he came in 1825. He served in the ministry of the German Reformed church, 1835-52, but from that date on was in the Dutch Reformed church, and from 1861 till his death, July 20, 1871, was professor of didactic and polemic theology in the theological seminary in New Brunswick, N. J. His reputation rests upon his intense opposition to the Church of Rome as a theological, ecclesiastical, and political organization. Many are his translations and original works upon this theme. The best known, perhaps, is his translation of the *Synopsis of the Moral Theology of Peter Dens*, as *Prepared for Romish Seminars and Students of Theology* (Philadelphia, 1842, new ed. 1856). He was a man of wide learning and considerable controversial power. For a sketch of Berg, with bibliography, consult Cowwin, *Manual of the Reformed Church in America* (New York, 1870).

BERG-ADDER. The South African puff-adder (q.v.).

BERGAGNE, bér'gá'n'y', ABEL (1838-88). A French Sanskrit scholar. He was born at Vimy, Aug. 31, 1838, and died Aug. 6, 1888. His name is a prominent one in the field of Sanskrit philology, in which he won distinction, especially by his contributions to the interpretation of the Veda. He was professor of Sanskrit at the Sorbonne, and among his published works, *La religion védique* (3 vols., Paris, 1883) is the most important. He made excellent translations of the Sanskrit dramas *Nágánda* (Paris, 1870) and *Sacountalá* (Paris, 1884).

BERGAMA, bér'ga-ma (anciently, Gk. Πέργαμος, Pergamon). A city of Asiatic Turkey, viayet of Smyrna, situated in a beautiful and fertile valley, on the right bank of the Caicus, about 40 miles north-northeast of Smyrna (Map Turkey in Asia, B 3). In early times the city was the capital of the Kingdom of Pergamus (q.v.). Many ruins still exist to attest the former magnificence of Bergama. The modern town contains several kháns and numerous mosques. There is trade in wool, cotton, and opium, and leather is manufactured. The population is about 7500, including a number of Greeks, who have established excellent schools.

BERGAMASCO, bér'ga-mas'kò, IL. See CASTELLO, GIOVANNI BATTISTA.

BERGAMO, bér'ga-mò (the town on the hill, from Celt *brig*, Ger *Berg*, hill). A city, the capital of the province of Bergamo, north Italy, 33 miles northeast of Milan (Map Italy, D 2). It consists of two distinct sections, the upper city and the lower city, connected by the Via Vittorio Emanuele, an avenue of chestnut trees. The appearance of the upper city, with its hilly streets, its ancient buildings, and its girdle of lofty ramparts, now turned into promenades, is picturesquely medieval, that of the city on the plain, with its factories and shops, is entirely modern. In the old city, grouped around Garibaldi Place, which contains a bronze statue

of the Liberator, are mediæval palaces, one of which is now the seat of Victor Emanuel Institute of Technology, with a fine museum. The first story of another palace is an open colonnade, containing a statue of Torquato Tasso, and in this palace is a civic library of 150,000 volumes. In addition there are the cathedral, the interior of which was restored in the seventeenth century, the beautiful twelfth-century church of Santa Maria Maggiore, which contains the monuments of the musicians, Donizetti and Mayr, the Colleoni chapel, with its art treasures, and the city hall. In the new town there are monuments to Cavour, and Victor Emmanuel II, a number of churches, and an art school, the Accademia Carrara, in which there is an important collection of paintings. In industry and commerce Bergamo is one of the busiest cities in Italy, and was the first to introduce the culture and the manufacture of silk. Other manufacturers are those of clothing, hats, iron implements, pottery, and organs. The railway put an end to the importance of the once famous fair of San Alessandro. The ancient Bergamum was a Gallic settlement, which received civic rights from Caesar. The town became part of the Venetian dominion in 1428. Pop., 1881, 40,000, 1901, 47,772, 1911, 53,857.

BERGAMOT (from the Italian city *Bergamo*), *Citrus aurantium bergamia*. A variety of lime or lemon with a very aromatic rind, yielding, either by expression or distillation, the volatile oil of Bergamot (known in the perfumery trade as *essence of bergamot*). The oil is a product chiefly of southern Italy and is much used in perfumery. It is a thin, greenish liquid with a bitter taste. Its peculiar aromatic odor is due probably to linalol acetate, $\text{CH}_3\text{COOC}_{10}\text{H}_{19}$, of which it contains about 20 per cent.

The name "bergamot" (evidently a corruption of Turk *beg armada*, a lord's pear) is also applied, in Great Britain and upon the continent of Europe, to various kinds of pears, to which, however, no common distinctive character can be assigned. The proper bergamot pear is a flattish, rough-skinned pear with a long stalk. It has a very soft and juicy pulp of an extremely pleasant flavor and is esteemed as one of the best dessert pears. Metzger, in his work on the pomaceous fruits of the south of Germany (Frankfort, 1847), described no less than forty-seven kinds of pears that bear the name of "bergamot," although some of them are very different from one another.

Finally, "bergamot" is also the popular name of several labiate plants, as in England of *Mentha citrata*, and in the United States of *Monarda fistulosa* and *Monarda didyma*.

BERGEDORF, bër'c'e-dôrf. A town of northern Germany, situated on the Bille, 10 miles southeast of Hamburg, and connected with the Elbe by a navigable canal. It gives its name to the surrounding agricultural territory, and its most important industry is the manufacture of glass and enameled ware. Lesser productions are cane chairs, brushes, and buttons, and there are tanneries and brick yards. The town is the seat of a district court and has a *real schule* and an institution for the blind. It is the birthplace of the composer, Johann Adolf Hasse. Pop., 1890, 6957, 1900, 10,243, 1910, 14,907. Bergedorf was held jointly by Lubeck and Hamburg until 1867, when Lubeck resigned its rights to Hamburg on payment of 200,000 thalers.

BERGEN, bër'gen (Ger *Berg*, hill, referring to its position). A seaport city of Norway, forming a separate prefecture (amt), situated on a promontory at the head of a deep bay, called Vaagen, on the Atlantic coast, in lat 60° 24' N, long 5° 18' E (Map Norway, A 6). The land area is 5 square miles. Except on the mountainous northeast side, Bergen is surrounded by water. It is walled, and additionally protected by several forts, now used merely as barracks and depots for supplies. The entrance to the harbor is dangerous without a pilot, but within the harbor is safe and commodious. Though Bergen lies farther north than St Petersburg, its climate is very mild and moist, winter being of short duration. The temperature is seldom below 18° F, but the rainfall is heavy, averaging 72 inches. Bergen is built in a semi-circular form round the harbor and has a picturesque appearance from the sea. It is generally well and substantially built, the older houses being of wood, and the streets being intersected by open spaces as a precaution against fires. A portion of the city, burned in 1855, has been rebuilt very regularly. Electric tramways traverse the principal streets. Its chief buildings are the cathedral, the naval academy, the public library with 90,000 volumes, the observatory, and the general museum. Bergen's principal industries are shipbuilding and barrel making. The city's chief importance is derived from cod fishing, it being the great fish market of Norway. Twice a year the Norlandmen come to Bergen with their fish. In March and April several hundred vessels are to be seen in the harbor at once, laden with the produce of the winter fishing and with skins and feathers. The summer fishing is not quite so productive. Codfish for salting, fish roe, blubber, skins, herrings, and cod-liver oil are the chief exports, amounting to two-fifths those of the entire country. A fair, attended by fishermen of all nations, is annually held. A fishery museum was established here in 1881. The chief imports are brandy, wine, corn, cotton, woollens, hemp, sugar, coffee, etc. Bergen is second only to Christiania in the export and shipping trade of Norway, and her citizens own one-third of the shipping of the country. The United States is represented by a consul. There is a marine biological station here. Bergen was founded about 1070, by Olaf Kyrre, who made it the second city in his kingdom, and it was soon raised to the first rank. The first treaty entered into by England with any foreign nation was made with Bergen in 1217. But the English and Scottish traders were soon displaced by the merchants of the Hanse towns, who made Bergen one of their four depots, compelled the fishermen to trade here exclusively, and continued to exercise and abuse their monopoly until their supremacy was broken by an act issued by Frederick II of Denmark in 1560. In 1763 their last warehouse fell into the hands of a citizen of Bergen. Pop., 1860, 28,758, 1890, 53,684, 1901, 72,251, 1910, 76,867.

BERGEN. The capital of the island of Rugen, Pomerania, Prussia, and of the neighboring islands (Map German Empire, E 1). It has a fine twelfth-century Romanesque church, with a lofty tower. There is a museum of local antiquities in the Rathaus. A fine view is obtained from the Rugard, 320 feet high, near the town, this hill is crowned by the ruins of a fortification destroyed in 1316 and by a com-

memorative tower to Arndt the poet Bergen has domestic and fishing industries, and manufactures leather and pastry Pop, 1900, 4005, 1910, 4200 Consult Haas, *Geschichte der Stadt Bergen auf Rugen* (Bergen, 1893)

BERGEN, bër'gen, JOSEPH YOUNG (1851-) An American scientist, born at Red Beach, Me He graduated in 1872 at Antioch College (Yellow Springs, Ohio), and was for a time successively a member of the Ohio Geological Survey and professor of natural sciences in Lombard University (Salsbury, Ill.) In 1883 he became principal of the Peabody (Mass.) high school and subsequently an instructor in the English high school of Boston (1889-1901) His publications include a text-book of *Physics* (with Prof E H Hall, 1891), *Elements of Botany* (1896), *Principles of Botany* (with B M Davis, 1906), *Practical Botany* (with O W Caldwell, 1911), *Introduction to Botany* (id, 1914)

BERGENGREN, ANNA (FARQUHAR) (1865-) An American novelist Her books include *A Singer's Heart* (1897), *The Professor's Daughter* (1899), *Her Boston Experiences* (1900), *The Devil's Plough* (1901), *Her Washington Experiences* (1902), *An Evans of Suffolk* (1904) She married the cartoonist, Ralph Wilhelm Bergengren, in 1900

BERGEN-OP-ZOOM, bër'ën-öp-zôm' (Dutch, 'the hill-fort on the Zoom', Ger *Berg* hill) A town in the province of North Brabant, Netherlands, about 20 miles north of Antwerp, on the river Zoom, at its mouth in the east branch of the Scheldt (Map Netherlands, C 3) It contains several fine parks, an old castle, the old Gothic "Great Church," the Margrave's palace, which has been converted into barracks, and the townhall Bergen-op-Zoom's industries include the making of cloth, pottery, and bricks, and it raises and exports considerable quantities of oysters and anchovies The town is connected by a canal with Antwerp and has railway communication with other cities Bergen-op-Zoom originally belonged to the margravate of Stryen It was taken by the Dutch in 1576 and successfully held against the Spanish all through the War of Independence, during which it sustained five sieges It was strongly fortified by the engineer, Coehoorn, but was, nevertheless, taken by the French under Lowendal in 1747 In 1794 it capitulated to the French under Pichegru Pop, 1899, 13,668, 1910, 15,000

BERGENROTH, bër'ën-rôt, GUSTAV ADOLF (1813-69) A German historian He was born at Oletzko (East Prussia) and studied at the University of Königsberg He entered the diplomatic service, from which he was dismissed for participation in the Revolution of 1848, and in 1850-51 was in America In 1857 he settled in England, there to pursue in the state archives investigations concerning the times of the Tudors To this end he also visited Simancas, Spain, and in 1862-68 published in London his *Letters, Dispatches, and State Papers Relating to the Negotiations between England and Spain* (3 vols.)

BERGER, bër'zhâ', GEORGES (1834-1910) A French critic and essayist, born in Paris and educated at the Lycée Charlemagne His early success as proprietor of a vineyard made it possible for him to give undivided attention to his chief interest, the study of art Widely versed as he came to be in everything that would be covered

under the head *objets d'art*, his services were found especially valuable in connection with the great exhibitions of 1867, 1878, and 1889, for their arts sections he was virtually responsible He was professor of aesthetics and the history of art in the National Fine Arts School during a long period, acted as an officer of public instruction, and served as a member of the Chamber of Deputies from the department of the Seine It was through his influence that the French government was induced to concede the Pavillon de Marsan in the Louvre to the Society of the Central Union of Decorative Arts Berger was chosen a member of the Institute of France, the Higher Council of Fine Arts, and the Council of National Museums He made many contributions to the *Journal des Debats* and wrote an important work called *The French School of Painting from its Origin down to the Reign of Louis XIV* (1879)

BERGER, bër'ër, LUDWIG (1777-1839) A German pianist and composer, born in Berlin, where he studied with Gurrlich and Clementi He followed Clementi on his concert tours to St Petersburg (1805), Stockholm, and London (1812) Afterward he returned to Berlin, where he became the instructor of Mendelssohn, Taubert, Henselt, and many other rising artists of the day His pianoforte works, such as the *Toccata*, the *Studies*, and the *Rondo*, are still popular

BERGER, PHILIPPE (1848-) A French Orientalist, born at Beaucourt, Alsace He studied at Strassburg and Paris and was assistant librarian of the Institute and professor of Hebrew at the Sorbonne He succeeded Renan as professor of Hebrew, Syriac, and Chaldean at the College de France He published *L'Ecriture et les inscriptions sémitiques* (1880), *L'Arabe avant Mahomet* (1885), *Histoire de l'Ecriture dans l'antiquité* (1892), *Etudes sur les renseignements fournis sur le gnosticisme par les Philosophoumena* (1893), *Le Musée Saint-Louis de Carthage, antiquités phéniciennes* (1900) Numerous memoirs and articles on archaeology and Phœnician inscriptions in scientific magazines are by him Berger's later writings include *Un nouveau tarif des sacrifices a Carthage* (1910), and *Le culte de Mithra a Carthage* (1912)

BERGER, VICTOR L (1860-) An American Socialist leader and editor He was born in Nieder Rebbuch, Austria-Hungary, and was educated in a gymnasium and at the universities of Budapest and Vienna After his family's removal to the United States he first worked at various trades in Milwaukee, then became a teacher in the public schools Later his literary ability and interest in the cause of Socialism brought him into prominence From 1892 to 1896 he was editor of the *Milwaukee Daily Vorwaerts*, and later he edited *Wahrheit*, a German Socialist paper, the *Social Democratic Herald*, and, as editor in chief, the *Milwaukee Leader* (a Socialist daily) Berger was a delegate to the People's Party Convention at St Louis in 1898, and helped to found the Social Democracy and the Social-Democratic party in the United States By the Social-Democrats he was chosen in 1904 candidate for mayor of Milwaukee and also for member of Congress In 1911, after a year as alderman in Milwaukee, he was again nominated for Congress, and this time was elected, the first Socialist ever chosen to a seat in the House of Representatives In addition

to editorials, his writings include numerous pamphlets and essays on social questions

BERGERAC, bâi'zhrak' (*Brageracum* of the Middle Ages) A town in the department of Dordogne, France, about 25 miles south-south-west of Périgueux (Map France, S, E 4) It is situated in a fertile plain on the right bank of the river Dordogne, which is here crossed by a fine bridge of five arches It has a fine Gothic church, Notre Dame, built in 1856, a court-house, and is the seat of a Protestant Consistory Its industries comprise brewing, tanning, flour and paper milling, extensive production of serges, iron, copper ware, hats, and hosiery It has a large trade in fish, wine, brandy, etc., being in fact the entrepôt of trade in the department, which is celebrated for its wine, known as Bergerac, or "small champagne" Pop., 1901, 13,966, 1906, 15,623, 1911, 16,162 Bergerac was taken and fortified by the English in 1345, who, after being driven out by Louis of Anjou, again got possession of it and retained it until 1450 The town suffered greatly in the religious wars It was dismantled by Louis XIII in 1621

BERGERAC, bâi'zhrak', CYRANO DE A tragedy by Edmond Rostand, in five acts, based on the life of Savinien Cyrano de Bergerac and the stories concerning him The title rôle was first played in Paris, by Coquelin, at the Porte Saint-Martin Théâtre, on Dec 28, 1897, and in New York, by Mansfield, on Oct 3, 1898 See ROSTAND

BERGERAC, SAVINIEN CYRANO DE (1619-55) A French novelist and dramatist, important in the development of realism in the novel and on the stage He was born in Périgord and educated at the Collège Beauvais, whose principal was the butt of his satire in *Le pédant joué* (1654) Later he derived from Gassendi an interest in science, and from Campanella some astrological lore He divided his young manhood between literature and gay adventure, served two years in the Guards (1639-41), and was twice wounded He had through life the reputation of a reckless duelist He traveled in England and Italy, possibly also in Poland He died as the result of an accident after an illness of 14 months, during which it is claimed that his manuscripts were mistreated and altered by the Jesuits He had published during his short and restless life a volume of letters largely satirical, a political satire on Mazarin as *Le ministre d'état flambé*, *Agrippine*, a tragedy (1653), and *Le pédant joué*, a comedy (1654) His most famous book, *Histoire comique des états et empires de la lune*, appeared in 1656 (possibly in 1650), followed in 1661 by *Histoire comique des états et des empires du soleil* These books were suggested indirectly by Lucian, Dante, and Ariosto, but immediately by the English Godwin's *Man in the Moon* (1638), and Wilkins's *Discovery of a New World*, i.e., the moon (1638) Thus Bergerac was one of the first in France to show the influence of English fiction His stories furnished suggestions to Fontanelle, Voltaire, Restif de la Bretonne, Edgar Allan Poe, and Jules Verne, undoubtedly, also, to Swift in the inferior part of *Gulliver's Travels*, but the only editions known have evidently passed through a bungling censorship, probably that of the Inquisition, for Bergerac was a freethinker, who had dared to write "Reason alone is my queen," even in the day of Bossuet What is left is verbally orthodox, but mockingly ironical Even so, the books reveal a

mind of great originality and power Both Comic Histories involve much of the science of the day, much superstition ironically introduced, a keen satire on the Inquisition in Galileo's case, a defense of Copernicus, many fine descriptive passages, and some startling forecastings of modern discoveries (like the phonograph), of a universal language (Volapuk, Esperanto), and of the Wagnerian tone-drama Through all runs a gasconading humor His own large nose is justified by the moon-children, who tell him that it is the infallible sign of "a witty, courteous, affable, generous, open-minded man" Such little personal touches and a rare power of relating the impossible with logically and mathematically consistent detail give an air of probability to his most whimsical fancies, as was the case in English literature with both Swift and Defoe His narratives are planless, and as works of literary art their place is low, but Bergerac was the first to use the novel to teach natural science, and so was a forerunner of the encyclopædists of the next century, and of Jules Verne and H G Wells in the nineteenth and twentieth, just as in the drama he had been first to break definitely with the unities in tragedy, which were not to be wholly done away till 1830 His *Pédant* is almost the first French comedy of character in prose The *Comic History of the States and Empires of the Moon and of the Sun* is reprinted with a scholarly introduction by Paul Lacroix (Bibliophile Jacob, 1858) There are two English contemporary translations and a modern partial one, called forth by the popularity of Rostand's (qv) drama, *Cyrano de Bergerac* (1892) Consult the *Life and Study*, by Biun (1893) Bibliographical details and an appreciative critical essay are in Kortring's *Geschichte des französischen Romans in XVII Jahrhundert*, vol II, pp 160-205 (Leipzig, 1885-87)

BERGERAT, bâi'zhra', EMILE (1845-) A French author He was born in Paris and was educated by the Jesuits and at the Lycée Charlemagne He first devoted himself to painting and afterward to journalism He became widely known through his *Biographies contemporaines* (1875), his biography of Théophile Gautier (1884), and above all by his admirable *feuilletons* in *Figaro*, to which journal, under the pseudonym of "Caliban," he regularly contributed caricature sketches These *feuilletons* have been collected under the following titles: *Vie et aventures du Sieur Caliban* (1886), *Le livre de Caliban* (1887), *Figarismes de Caliban* (1888), *Le rire de Caliban* (1890), *Les soirées de Caliban* (1892) He also published *Poèmes de la guerre* (1871), a novel, *Familias malgré lui* (1883), a dramatic poem, *Enguerlande* (1884), *La lune comique* (1889), *La terre est le domaine de l'humanité* (1903), *Le petit morcan* (1908), *Ballades et sonnets* (1910), *Souvenirs d'un enfant de Paris* (vol I, 1911, vol II and vol III, 1912, vol IV, 1913)

BERGH, bérgh, HENRY (1820-88) An American humanitarian He was born in New York and educated at Columbia University He was Secretary of Legation at St Petersburg and acting vice consul, 1862-64, but resigned, owing to the severity of the climate In 1865 he became interested in the treatment of domestic animals, and in the face of much opposition and ridicule succeeded, in 1866, in getting an incorporation of the American Society for the Prevention of Cruelty to Animals The work of the society,

covering all cases of cruelty to all sorts of animals, commended itself to the better class of the people, and its growth, aided by numerous gifts, was rapid and substantial. In 1886 the laws which Bergh had procured for the State of New York had been adopted by thirty-nine States of the Union, also in Canada, Brazil, and the Argentine Republic. Bergh was also the founder of the Society for the Prevention of Cruelty to Children, which is now established in nearly every State and Territory of the Union. He wrote several plays, among them *Lois's Alternative*, a drama, also *The Streets of New York*, a volume of tales and sketches.

BERGH, JOHAN EDVARD (1828-80). A Swedish landscape painter. He studied at the academy of his native city, Stockholm, where he received the first prize in 1853. Afterward he pursued his studies with Gude at Dusseldorf and with Calame at Geneva. After a tour through Italy (1856-57) he became member of, and in 1861 professor in, the Stockholm Academy. He may be said to have founded a new school of landscape painting in Sweden—a school characterized by accuracy of drawing, faithful interpretation of nature, and a marked spirit of nationalism, manifested both in choice of subjects and method of treatment. Among the most popular paintings of Bergh are the following: "Wood Interior" (Stockholm Museum), "Beech-Wood" (Sothenburg), "View of Stockholm" (owned by the King of England), "View in Dalecarlia" (Amsterdam).

BERGH, BÉRK, LAURENT PHILIPPE CHARLES VAN DEN (1805-87). A Dutch historian. He was born at Dusseldorf and studied at Utrecht. He was archivist of the government of The Hague from 1865 to 1887. His numerous and valuable publications include the following: *Verslag der historischen nasporingen op oecan van het gouvernement in 1838 in Fiankrijk gedaan* (1840), *Gedenkstukken tot opheldering der nederlandsche geschiedenis, opgezameld uit de archieven te Rijssel en op gezag van het gouvernement uitgegeven* (1842-47), *Register van hollandsche en zeeuwsche oorkonden* (1861), *Oorkondenboek van Holland en Zeeland* (1866-73).

BERGH, PIETER THEODOR HELVETIUS VAN DEN (1799-1873). A Dutch poet. He was born at Zwolle and lived successively in Paris, Brussels, and Vienna. Afterward he became blind and returned to The Hague, where, in collaboration with Weland, he edited the *Magazijn voor Toon en Schilderkunst*. His comedy, *De Neven* (1837), was very favorably received and is ranked among the best modern works of its class. Among his other works may be mentioned *De Nachten* (1841) and *Proza en Poëzij* (1853).

BERGHAUS, BÉRK'HAUS, HEINRICH (1797-1884). A German geographer, born in Cleves, Prussia. In 1816 he was made "geographical engineer" in the War Department in Berlin and was employed on the trigonometrical survey of Prussia. In 1825 he became professor of applied mathematics in the Architectural Academy of Berlin and in 1839 director of a school of geography in Potsdam. The best known of his cartographical works is his *Physikalischer Atlas* (90 plates, Gotha, 1838-48), which forms the basis of Johnston's work of the same title, published in Edinburgh. He published *Was man von der Erde weiss* (1856-60), *Atlas der österreichischen Monarchie* (1855-60), *Landbuch der Mark Brandenburg* (3 vols., 1853-56), *Land-*

buch von Pommern (1882), *Briefwechsel Alexander von Humboldts mit H. Berghaus* (1863).

BERGHAUS, HERMANN (1828-90). A German cartographer, nephew of Heinrich Berghaus. He was born at Hreford, Westphalia. From 1872 he was employed in the Geographical Institute of Justus Perthes at Gotha, and besides the widely known *Chart of the World* (1863), which has passed through 11 editions, he published *Physikalische Karte der Erde* (1874), *Physikalische Wandkarte von Europa* (1875), *Karte der Alpen* (1878), *Physikalische Wandkarte von Afrika* (1881), and the revised edition of his uncle's great *Physikalischer Atlas* (1886), in which he was aided by a number of noted specialists.

BERGHEM, CLAES. See **BERCHEM, CLAES**.

BERGISCH GLADBACH. See **GLADBACH**.

BERGK, THEODOR (1812-81). A distinguished German classical scholar. He was born in Leipzig, and from 1842 to 1869 was professor of philology at Marburg, Freiburg, and Halle. In 1869 ill health forced him to resign, and the remainder of his life was spent in the preparation of his *Geschichte der griechischen Litteratur*, of which he finished only the first volume in 1872, the other two being edited by G. Hinrichs and R. Peppmüller (1883-87). It is a work of great importance. Bergk's chief complete work is his *Poetae Lyrici Graeci* (3 vols., Leipzig, 1843, 4th ed., 1878, vol. 1 in 5th ed. by Schroeder, 1900). He also published numerous philological papers and several editions of individual Greek poets. Consult Sandys, *A History of Classical Scholarship*, vol. III (Cambridge, 1908).

BERGMAN, BÉRK'MAN, TORBERN OLOF (1735-84). A Swedish chemist and mathematician. He was born at Katharberg. He was sent to the University of Upsala, with a view to prosecuting studies qualifying him either for the Church or the bar, but disliking both, he devoted himself to natural history, physics, and mathematics, and soon made some interesting discoveries in entomology and distinguished himself as an astronomical observer. In 1758 he was made professor of physics, and several years later, after publishing an excellent work on the manufacture of alum, professor of chemistry and mineralogy, at the University of Upsala. Bergman published a vast number of dissertations, a collection of which, in six volumes, appeared at Upsala in 1779-81, under the title *Opuscula Torberni Bergmani, Physica, Chemica, et Mineralia*. His celebrated essay on *Elective Attractions* was translated into English by Dr. Beddoes.

BERGMANN, BÉRK'MAN, ERNST VON (1836-1907). A German surgeon, born at Rügen, Livonia, Russia. He studied at the universities of Dorpat, Vienna, and Berlin, was connected with the hospital service in the War of 1866 and the Franco-Prussian War, and in 1871-78 was professor of surgery at Dorpat. From 1878 to 1882 he was professor at the University of Würzburg and in the latter year was appointed professor of surgery at Berlin. His publications include the following treatises: *Zur Lehre von der Fettembolie* (1863), *Die Resultate der Gelenkresektionen im Kriege* (1872), *Die Lehre von den Kopfverletzungen* (1880), *Die chirurgische Behandlung von Hirnkrankheiten* (1898), *Handbuch der speziellen Chirurgie* (3 vols., 1899-1901).

BERGMANN, JULIUS (1840-1904). A Ger-

man philosopher. He was born at Opherdike, Westphalia, and studied philosophy and mathematics at the universities of Göttingen and Berlin. In 1872 he became professor of philosophy at Königsberg, and in 1875 was called to Marburg in the same capacity. The following are among his principal works: *Grundlinien einer Theorie des Bewusstseins* (1870), *Zur Beurteilung des Kriticismus* (1875), *Reine Logik* (1879), *Sein und Erkennen* (1880), *Die Grundprobleme der Logik* (1882, rev. 1895), *Geschichte der Philosophie* (2 vols., 1892-94), *Untersuchungen über Hauptpunkte der Philosophie* (1900), *System des objektiven Idealismus* (1903).

BERGMANN, KARL (1821-78). An American musician. He was born at Ebersbach, Saxony, studied at Zittau and Breslau, and came to America in 1850 as a member of the Germania Orchestra, the leader of which he afterward became. From 1862 until his death he was conductor of the Philharmonic Orchestra in New York City and in this capacity contributed greatly to the advancement of good music in America.

BERGMEHL, BÉR'MAL. See DIATOMACEOUS EARTH.

BERGONZI, BÉR-GŌN'tsé, CARLO (flourished c. 1715-55). A famous violin maker of Cremona. Of his life nothing is known beyond the fact that he was a pupil of Stradivari, when the latter was in his golden period. There are but a few violins of Bergonzi in existence, and they are very valuable, not only because of their rarity, but also because of their great beauty and remarkable tone.

BERGSOE, BÉR'sé, JØRGEN VILHELM (1835-1911). A Danish naturalist, novelist, and poet, born in Copenhagen. In the course of biological researches at Messina he became partly blinded by excessive use of the microscope and so was diverted to fiction. His first novel, *Piazza del Popolo* (1866), was very successful and was followed by many others, of which *Who Was He?* ('Hver var han?' 1878) is the best. A volume of poems, *Now and Then* ('I ny og nae,' 1807), is inferior, but all his work shows a marked originality, an exuberant imagination, close observation, and a delicate touch. Bergsoe also wrote an historical work, *Rome under Pius IX* (1877).

BERGSON, BÉR'sŏn', HENRI LOUIS (1859-) A French philosopher of Jewish extraction. He was born in Paris, educated in the public schools, and in 1881 graduated from the École Normale. After some years of teaching he was appointed to the chair of philosophy in the Collège de France in 1900. He was elected to the Institute in 1901 and to the Academy in 1914. In 1913 he lectured at Columbia University and there received the degree Litt. D. In the same year he was elected president of the Society for Psychological Research. He has published the following books: *Quid Aristoteles de loco senserit* (1889), *Essai sur les données immédiates de la conscience* (1889, Eng. trans., under the title *Time and Free Will*, London and New York, 1910), *Matière et mémoire, essai sur la relation du corps avec l'esprit* (1896, Eng. trans., London and New York, 1911), *Le rire, essai sur la signification du comique* (1900, Eng. trans., New York, 1911), *L'Évolution créatrice* (1907, Eng. trans., New York, 1911), *La Perception du changement* (Oxford, 1911), and a number of articles in journals, one of which has

been translated into English (*Introduction to Metaphysics*, New York and London, 1912).

For Bergson time is the fundamental reality, but real time (*la durée réelle*) is not time as conceived in science: pure duration is "nothing but a succession of qualitative changes, which melt into and permeate one another, without precise outlines, without any tendency to externalize themselves in relation to one another, without any affiliation to number." Science and common sense, for the practical purposes of life, externalize this time and separate it into discrete moments, setting them out in a line. To get an experience of real time we must withdraw ourselves from our practical interests, as when we dream. Then "we no longer measure duration, but we feel it." "Pure duration is the form which the succession of our conscious states assumes when our ego lets itself live, when it refrains from separating its present from its former states." It is enough that in recalling these states, it does not set them alongside its actual state as one point alongside another, but forms both the past and the present into an organic whole, as happens when we recall the notes of a tune, melting, so to speak, into one another. Time, as thus experienced, is "the continuous progress of the past, which gnaws into the future and which swells as it advances." The future is not yet and is unpredictable. This real time is the time of which true freedom consists. "The free act takes place in time which is flowing and not in a time which has already flown." Such a time is memory. Memory "is not a faculty of putting away recollections in a drawer or of inscribing them in a register. There is no register, no diawer, there is not even, properly speaking, a faculty, for a faculty works intermittently, when it will or when it can, whilst the pling up of the past upon the past goes on without relaxation. In reality the past is preserved by itself, automatically. In its entirety, probably, it follows us at every instant." Such a flowing time, carrying its past along with it, is life, is spirit. The appearance of the new in such a time is an evolution which is creative. The intellect is unable to do justice to the nature of life and of spirit, because the intellect is a function of life which has developed to deal with what is spatial and with that alone. Instinct would enable us to understand life except for the fact that instinct does not aim at understanding. It is always directed towards a particular concrete object. What is needed is intuition, which has the directness of instinct and the broad scope of intellect. Intuition is "instinct which has become disinterested, self-conscious, capable of reflecting on its object and of enlarging it indefinitely." Almost all previous philosophies, Bergson thinks, have been constructed by intellect alone or by intellect preponderantly. Bergson's philosophy is anti-intellectualistic in that it attempts to escape the limitations of intellect, it relies upon intuition.

The literature on Bergson's philosophy is already very extensive. Consult Lindsay, *The Philosophy of Bergson* (New York, 1911), Stewart, *Critical Exposition of Bergson's Philosophy* (London, 1911), Kitchin, *Bergson for Beginners* (New York, 1913). For a bibliography fairly complete up to the year 1910 see the English translation of *Time and Free Will*.

BERGSTROM, BÉR'ström, HJALMAR (1868-) A Danish playwright. After obtaining his

Ph.D. in 1893 he was a teacher in the Brockske Commercial School until 1905. He became one of the directors of the Danish Dramatic Society and a member of the commission for the conservation of the neglected manuscripts and writings of Danish playwrights. His dramatic works include *Tuning-points*, *Pictures of Many Colors*, *Burnt Ships*, *When King David Grew Old*, *Idas Bryllup*, *Ida's Wedding* (1902), *Montgairde 39*, *Mint Street 39* (1904), *Lynggaard & Co* (1905), *Karen Borneman* (1907), *Together in the Dance*, *Det gyldne Skind*, *The Golden Fleece* (1908), *Dame Te*, *The Birthday Party* (1910), *Med i Dansen*, *In the Swim* (1910), and *Fegen til Gud*, *The Way to God* (1912). These were played in the Royal Theatre. Much of his work is iconoclastic and shows a tendency toward humor of a rather coarse type. When *Karen Borneman* was produced in 1907, it aroused such a storm of protest that it had to be withdrawn and was subsequently forbidden. The ban on it has since been taken off. *Karen Borneman* and *Lynggaard & Co* were published in an English translation by Edwin Bjorkman in the *Modern Drama Series* (New York, 1913).

BERGUES, berg (probably from Ger *Berg*, hill, fort). A fortified town of France, in the department of Nord, about 34 miles north of Lille (Map France, N, H 2). It is situated on the Colme, at the foot of a hill, and has facilities for laying the valley under water, as a defensive measure in war time. It is situated at the confluence of three canals, one of which admits vessels of 300 tons' burden and connects Bergues with Dunkirk and the sea. This circumstance, united with its central position, makes it the entrepôt of the adjoining country. It has manufactures of beer and oil, and also sugar and salt refineries. Pop., 1901, 4750, 1906, 5032, 1911, 4856. Bergues was first walled and fortified by Baldwin II, Count of Flanders, and Baldwin IV erected a splendid abbey, of which two towers only remain, in honor of St. Winoc, who retired here in the beginning of the tenth century. Bergues has suffered all the vicissitudes of a frontier fortress, it was finally taken by Louis XIV in 1667, and Vauban so effectively fortified it that the English found it impregnable in 1793.

BERGYLT, bergylt (Norweg *berggylta*, from *berg*, hill, cliff + *gylta*, low). A European name for the rosefish (q.v.).

BERHAMPUR, berham-poor'. The name of two towns in British India. 1 A military station and capital of the district of Ganjam in Madras, in lat 19° 20' N and long 84° 50' E, 525 miles northeast of Madras, and 325 miles southwest of Calcutta (Map India, D 5). There is a college and a cantonment which has been abandoned. It is situated on a rocky ledge, and commands on the south and east a plain of considerable extent, on the near edge of which is the native town, noted for its manufactures of gold, embroidered turbans, and tussah-silk cloths. Sugar is also manufactured and exported. Pop., 1901, 25,729, 1911, 31,456. 2 A town of Bengal, in the district of Murshidabad, on the left bank of the Bhagirathi, the first great offset of the Ganges, in lat 24° 5' N and long 88° 17' E, distant from Calcutta, by land and water respectively, 118 and 161 miles (Map India, E 4). It was formerly one of the principal military stations in British India. The grand square, inclosing a spacious

parade ground, is particularly striking, and the quarters of the European officers form handsome ranges of brick-built and stuccoed edifices. There are here a college, hospitals, and mission churches. Berhampur is the seat of a civil establishment and the houses of its chief members, erected in convenient spots in the neighborhood, give the place an air of grandeur and importance. Berhampur, though at one time extremely unhealthy from its low and moist site on the delta of the Ganges, has been so much improved by sanitary measures as to be second to no spot in Bengal in salubrity. The first outbreak of the Sepoy Mutiny occurred at Berhampur in the spring of 1857. Pop., 1901, 24,397, 1911, 22,777.

BERIBERI. A disease prevalent in tropical and subtropical countries, particularly in the Far East, and classed as a neuritis of infectious origin. It is well distributed over Japan, China, the Dutch East Indies, and the Philippine Islands, but occurs sporadically in all parts of the world. Baelz and Miura in 1905 estimated that 50,000 cases occurred annually in Japan (where the disease is called *Kakke*), and during the Russo-Japanese war over 50,000 cases occurred in the Japanese army alone. Beriberi was mentioned by Chinese physicians in the second century and described in the sixth century, while Japanese accounts go back to the seventh century A.D. The precise cause of beriberi has not been settled, in spite of a vast deal of investigation by students of tropical diseases in recent years. Two principal theories are advanced—the parasitic or infectious, and the dietetic. Although a number of parasites have been found in association with the disease, none have yet been shown to cause it. On the other hand, diet has been proved, by abundant observation, to have at least a powerful causative influence. Fish and rice are the foods most commonly implicated. In the Philippines the rice theory has been carefully tested by the United States medical service, and certain important premises laid down. It has been observed (1) that populations living on rice milled in the crude native way (which retains the bran or pericarp of the rice kernel) are little troubled with the disease, (2) that such populations, if fed on polished rice, became susceptible, (3) a return to unpolished rice controlled the disorder, (4) nurslings developing beriberi from sick mothers were cured by the addition of an extract of rice polishings added to their milk, (5) fowls fed exclusively on polished rice developed a neuritis similar to that of beriberi and recovered on returning to an unpolished rice diet. A phosphorus body which no one had been able to isolate up to 1912, in the pericarp of the grain, is thought to be necessary to preserve the nutritional balance in people whose diet is largely restricted to rice. While these observations do not positively disprove the infectious theory, and may only show that a low state of nutrition renders the individual susceptible to infection, yet they have been applied with success in combating the disease. At the 1912 meeting of the Far Eastern Association of Tropical Medicine, the views of American, English, French, and Japanese sanitarians were practically unanimous in favor of the dietetic origin of the disease. Beriberi occurs in several clinical forms, three of which are well defined and all of which have the common symptoms of peripheral neuritis, with advancing

paralysis "Wet" and "dry" forms are distinguished, depending on the presence or absence of swelling and edema of the limbs. There is also a pronounced form, in which the victim rapidly succumbs to exhaustion and heart failure.

The mortality in recent years has been 2 to 6 per cent. There is no specific treatment. Change of diet and hygienic measures have given the best results. In Japan and Java the adsuki bean (*Phaseolus sradatus*) is considered both prophylactic and curative, while in the Philippines the mungo bean (*Phaseolus mungo*) enjoys a similar reputation. Consult Scheube, *Die Krankheiten der warmen Lander* (Jena, 1903), for history and literature up to that date, and the various numbers of the *Philippine Journal of Science* and the *Journal of the American Medical Association* for later investigations. See NEURITIS.

BERING, b'ring, *Dan pron b'ring*, sometimes **BEHRING**, *Virus* (1680-1741). A Danish navigator, born at Høien, in Denmark. He entered the service of Russia, and was employed on the great northern expedition planned by Peter the Great to determine the unknown limits of Asia. On Feb. 4, 1725, he started from St. Petersburg to cross Siberia, with orders to discover whether Asia and America are connected. After three years of preparation at Okhotsk and Kamchatka, he made a seven weeks' voyage as far as a point from which he could see no land toward the north or east. This northeasterly point of Asia had already been visited by Simeon Deshneff, a Cossack voyager, in 1648. Being wet back to St. Petersburg in the spring of 1730. A year later a vessel commanded by Michael Gvozdeff was driven from Cape Serde Kamen by a storm across to the Alaska coast, along which Gvozdeff sailed for two days. The Empress Anne ordered Bering to carry out his previous instructions, and in the spring of 1733 he returned to Okhotsk. He delayed there until September, 1740, when he sailed to Petropavlovsk, where he stayed until June 15, 1741. He sailed eastward, and on July 26 his lieutenant, who had separated from the commander during a fog, reached the North American coast near Cross Bay. Bering made land north of Cape St. Elias, July 29. When he started to return, he was driven about by storms until November 16, when his vessel was wrecked on the desert island still known by his name. He died there of exposure and disappointment, Dec. 19, 1741. His companions built a vessel, in which they returned to Kamchatka with more than \$100,000 worth of furs captured on the island. A life of Bering, by Lamidsen, was published in Chicago in 1890.

BERING ISLAND. A somewhat isolated island of the Commander group, lying west of the Aleutian group, in the northern Pacific, about lat. 55° N. and long. 166° E. (Map Asia, Q. 3). Here the navigator Bering died (1741) and was buried. It is rocky and desolate, population composed of natives and seal fishers.

BERING RIVER COAL FIELDS. See ALASKA.

BERING SEA. The extreme northern part of the Pacific Ocean, from which it is partly cut off by the Alaska Peninsula and the Aleutian Islands (Map The World, West Hem. D. 2, vol. 1, frontispiece). It is connected by Bering Strait with the Arctic Ocean and extends from Alaska to the shores of Asia. It has a north and south

extent of about 1000 miles and an east and west extent of over 1500 miles. It receives from Alaska the waters of the Yukon and other rivers. The islands are not numerous, the chief ones being the Pribylov, Nunivak, St. Matthew, and St. Lawrence. The northern half of the sea is shallow, with a depth of less than 600 feet (and much of it under 200 feet), but the southern half is from 6000 to over 10,000 feet deep.

BERING SEA CONTROVERSY. An international dispute, in which Great Britain and the United States were the principal parties concerned, arising out of the depredations of unlicensed Canadian sealers on the seal fisheries of the north Pacific.

The Pribylov Islands in the Bering Sea are the largest seal rookery in the world. The seals congregate upon these islands for about eight months in the year, leaving for a day or two at a time to seek food in the surrounding waters within a radius of 50 or 100 miles. In the winter the entire herd scatters far to the south and west in the Pacific Ocean. For ninety years the seals had been preserved under the supervision of the Russian government, and this was continued by the United States after the cession of Alaska in 1867, the business being leased to the North American Commercial Company and the slaughter carefully restricted to 100,000 seals annually. This represented in 1885 a capital of about \$30,000,000, and at a royalty of \$10 per skin, yielded the government a yearly revenue of \$1,000,000. In 1886 a fleet of vessels was fitted out in British Columbia by Canadian and American capital to hunt seals while feeding in the water beyond the territorial three-mile limit. This business increased rapidly, until in 1893 there were about 70 craft engaged in it. The number of seals captured was estimated at 30,000, and the depredations on the herd necessitated the reduction of the licensed slaughter to 21,000. This pelagic sealing was especially destructive, because the majority of the animals killed were females.

Secretary Manning, of the Treasury Department, ruled that Bering Sea, to the western limit covered by the Russian cession, was *closed*, or under the exclusive jurisdiction of the United States, and seizures of Canadian schooners were made by the American patrols. This occasioned protests from Sir Lionel Sackville-West, then British Minister. Meanwhile Secretary Bayard sent a circular letter to Great Britain, France, Germany, Japan, Russia, and Sweden, asking for cooperation to prevent destruction of the industry. Negotiations conducted between Great Britain and the United States resulted finally in the Blaine-Pauncefote Treaty of 1892, providing for an arbitration of the questions at issue.

The Court of Arbitration, composed of Baron de Courcel (France), Marquis Emilio Visconti-Venosta (Italy), Judge Grogers W. W. Giam (Sweden and Norway), Lord Hannen (England), Sir John Thompson (Canada), and Justice John M. Harlan and Senator John T. Morgan (United States), met in Paris, March 23, 1893.

The United States based its case upon three grounds. First, a prescriptive right of territorial jurisdiction over the Bering Sea, second, a right of private property in the seals, third, the common interest of mankind in the preservation of the species and the prevention of its ultimate annihilation for temporary gain. On August 15 the tribunal rendered a decision mainly unfavor-

able to the American contention, to the effect that Russia did not assert or claim exclusive jurisdiction over Bering Sea or rights in seal fisheries beyond the three-mile limit, that the body of water known as Bering Sea was included in the phrase "Pacific Ocean" in the Treaty of 1825, by which Russia granted Great Britain commercial privileges in those waters, that the United States had no right to protection of property in seals frequenting the islands of the United States beyond the three-mile limit. But regulations were adopted establishing a close season from May 1 to July 31, forbidding pelagic sealing within 60 miles of the Pribylov group, and prohibiting the use of steam vessels or explosive weapons, and provided for licensing of the vessels and proper qualifications of the parties engaged in the business, these regulations to be enforced by the governments of the United States and Great Britain acting concurrently.

These restrictions proved ineffectual, and after much friction between the two powers a meeting of experts was arranged for November, 1897. The American offer to suspend seal killing for a year meantime, provided the Canadian government would prevent pelagic sealing, was refused unless the Canadian vessels received compensation. Congress retaliated by prohibiting sealskin importation unless the skins were from the Pribylov Islands. The rapid depletion of the herd that had taken place was claimed by the British experts to be due to unscientific killing on the islands. Meanwhile, in accordance with the Treaty of 1896, a commission in 1897 had assessed the damages to Canadian shipowners by reason of American seizures at \$473,151.26, which was accepted by Congress and was paid in the following year. The whole question was finally referred to the Anglo-American Commission, which had reached no conclusion upon its indefinite adjournment in February, 1899, because of the deaths of Lord Herschel and Mr. Dingley. All efforts to restrict the wholesale destruction of seals have thus far proved unavailing, and the species bids fair to be exterminated. Consult Henderson, *American Diplomatic Questions* (New York, 1901), Snow, *Treaties and Topics in American Diplomacy* (Boston, 1894), and Stanton, *The Bering Sea Controversy* (New York, 1892).

BERING STRAIT A water passage separating Asia from America, and connecting the Pacific with the Arctic Ocean (Map America, N, B 2). It was first discovered and explored by a Cossack named Deshnev, in 1648, again explored by Bering in 1728, later by Cook and Beechey. The narrowest part is near lat 66°, between Cape Deshnev (East Cape) in Asia and Cape Prince of Wales in America. The distance between the two capes is about 40 miles. About midway are three uninhabited islands. The greatest depth, from 150 to 250 feet, is toward the middle, the water being shallower toward the American coast than the Asiatic.

BERINGTON, JOSEPH (1746-1827). An English Roman Catholic theologian. He is remembered for his *Faith of Catholics* (3 vols., London, 1813, 3d ed., 1840), and *Literary History of the Middle Ages* (1811, 3d ed., 1883).

BÉRIOT, bā'rē ō', CHARLES AUGUSTE DM (1802-70). A Belgian violinist and composer, born at Louvain. He was a precocious and original musician, remarkable for pure tone and refined taste. In 1836 he married the famous singer, Malibian. In 1842 he was made pro-

fessor in the Conservatory of Music in Paris, and later in that of Brussels, but he resigned his position nine years afterward, in consequence of failing eyesight. He was the author of a complete manual for the violin and of seven concertos, besides a great number of popular compositions for that instrument, all distinguished for noble sentiment, melodiousness, and brilliancy, showing great progress in the treatment of the instrument, as compared with his predecessors. By dint of his admirable technique and his eminence as a composer, he became the head of the Belgian school of violinists, which through him and his pupils, Vieuxtemps and Leonard, attained well-deserved fame.

BERISLAV, by'e-re-laf', or BORISLAV (Russ., take glory, referring to its capture from the Turks). A fortified town in the Russian government of Kherson, on the right bank of the Dnieper, 46 miles northeast of Kherson (Map Russia, D 5). It is the centre of the grain trade for the neighborhood. Berislav is supposed to have been founded in 1450 by the Turks, by whom it was called Kızı-Kermen. It was taken in 1696 by Peter the Great, and its name was later changed to Berislav. Pop, 1897, 12,000.

BERKELEY, bērk'li or bārk'li (AS Buice, Ger *Buke*, Eng *burch* + *leth*, Eng *lea*, *ley*, district, meadow, field). A small town of Gloucestershire, England, 15 miles southwest of the town of Gloucester, on the Avon, a mile and a half east of its junction with the estuary of the Severn (Map England, D 5). It is situated in a fertile valley, which has long been noted for its dairies and manufactures of cheese. In Berkeley Castle, which contains an interesting collection of portraits and relics, Edward II was murdered in 1327 by Maltravers and Gourney. Dr. Edward Jenner, the discoverer of vaccination, was a native of Berkeley. Pop, 1901, 6277, 1911, 6558.

BERKELEY, bērk'li A city in Alameda Co., Cal., adjoining Oakland, the county seat, 10 miles from San Francisco, on the Atchison, Topeka and Santa Fe and the Southern Pacific railroads (Map California, C 5). It has a fine location on heights overlooking San Francisco Bay and the Golden Gate, and is the seat of the University of California (q.v.), which has several notable buildings and occupies 250 acres of beautiful grounds, of the State Agricultural and Mechanical College, the California School of Arts and Crafts, three theological seminaries, and the State Institution for the Deaf and Blind. It also contains the Boone University Academy, Head Preparatory School for Girls, Snell Seminary for Girls, St. Joseph Academy, and a public and several school libraries. Berkeley has manufactures of coconut oil, refined petroleum, soaps, health foods, pianos, elevators, carbonic gas, aeroplane motors, pumps, etc. It also has important fishing interests. Berkeley, named after Bishop Berkeley, was settled in 1868 and was incorporated as a town in 1873. It adopted the commission form of government in 1909. The city is developing rapidly, more than \$2,000,000 being spent annually in building. Pop, 1900, 13,214, 1910, 40,434.

BERKELEY, bērk'li or bārk'li, GEORGE (1685-1753). Bishop of Cloyne, a distinguished philosopher. He was born near Thomastown, county of Kilkenny, Ireland, and was the eldest son of William Berkeley, a younger son of the family of the Earl of Berkeley. As a boy he

studied at Kilkenny School, at which Swift also received his early education, and in his fifteenth year he followed his great countryman to Trinity College, Dublin, where in 1707 he obtained a fellowship. At Trinity he enjoyed the society of Swift, who patronized him, as he did almost everybody, and who subsequently had a great deal to do in shaping his fortunes, while his philosophical views were formed upon the basis of Locke's.

Berkeley's career as an author began in 1707 (the year in which he obtained his fellowship) by the publication of a work written three years before, at the age of 19, entitled *Arithmetica abæque Algebra aut Euclide Demonstrata*. This was followed in 1709 by the celebrated *Essay Towards a New Theory of Vision*, in which he propounded the doctrine of the ideal character of visual space. Locke had already championed the view of the subjective character of the secondary qualities (qv), but "solidity, extension, figure, motion, or rest, and number," the primary qualities, were for him ideas whose "patterns do really exist in the bodies themselves." Berkeley, in his *Essay*, left solidity and number unquestioned, but reduced the remaining primary qualities to subjectivity, making the distance of any object mean the succession of muscular feelings that must be experienced before a tactual sensation of that object can be obtained. Space as the form of outness is thus explained as nothing but a way of looking at time. In his *Treatise Concerning the Principles of Human Knowledge* (1710), Berkeley went much further with his idealism. He maintained that matter cannot be conceived to exist, the only possible substance being mind. The material world is nothing but a complex of ideas, which come and go with an "order and coherence," that constitute the laws of nature. The ideas which are characterized by this coherence, by involuntariness, and by being involuntary, constitute what we call the "real" world. This doctrine is epitomized in the sentence *esse est percipi*, i. e., to be is 'to be perceived or known,' or 'existing is "being perceived"'. Berkeley's object was to undermine the materialism of the age by denying the reality of the external world. If there is no external world, he argued, the phenomena of sense can be explained only by supposing a deity continually necessitating perception. Common sense has tried to refute Berkeley by kicking a stone and pointing to the reality of the effect produced, but common sense does not realize that the effect is in that case evidently a sensation and an affection. In his rejection of abstract matter Berkeley has been upheld by many succeeding philosophic thinkers, although the crudeness of his idealism is quite generally recognized. Especially unfortunate, from the philosophical point of view, was his dogmatism in assuming the existence of a God to give permanence to the fleeting sensations of human experience. The procedure was a vicious circle. He set out to prove the existence of a God, and then at last assumed that existence in order to make his philosophical view tenable. And history has avenged itself for this illogicality, for Hume, working in the same philosophical spirit, came to an opposite theological conclusion.

In the *Introduction to the Principles*, Berkeley broached a doctrine that has proved of revolutionary significance in modern philosophy, viz., that there are no abstract general ideas. To be

sure, this thesis had been maintained by the Nominalists of the Middle Ages (see NOMINALISM), but Berkeley's statement of the position gave it its classical expression. "If any man has the faculty of framing in his mind such an idea of a triangle," as had been described by Locke, a triangle "neither oblique nor rectangular, neither equilateral, equiangular, nor scalenon, but all and none of these at once, it is vain to pretend to dispute him out of it." But "I cannot by any effort of thought conceive the abstract idea above described." And since Berkeley's day more and more thinkers have confessed to a similar inability. See ABSTRACTION.

In 1713 Berkeley went to reside in London, where in the same year he published a defense of his idealistic system, *Three Dialogues Between Hylas and Philonous*, which are remarkable, as indeed all his writings are, for the clearness and beauty of the style. Shortly after this he was appointed chaplain and Secretary of Legation under Lord Peterborough, whom he accompanied to Italy, but his first stay there was short. In 1716 he went abroad again, to stay four years. Upon his return he wrote, in 1721, an *Essay Towards Preventing the Run of Great Britain*, which was called forth by the craze in connection with the South Sea scheme. In 1721 he returned to Ireland, and in 1724 he became Dean of Derry, with an income of £1500, and resigned his fellowship.

Berkeley was not a man to remain in the enjoyment of leisure and opulence. The Dean of Derry set to devising schemes of usefulness, fixing at last on one by which his deanery and income were to be exchanged for exile and £100 a year. This was the Bermuda College scheme for training pastors for the Colonies and missionaries to the American Indians. Swift, failing to induce him to give up the project, made influence with ministers to support it, which they promised to do. Full of hope, Berkeley prepared for his exile. He married, in August, 1728, Anna, daughter of the Right Hon. John Foster, Speaker of the Irish House of Commons, and soon after sailed for Rhode Island. In that State, not far from Newport, he wrote the larger part of *Alciphron*, or, *The Minute Philosopher* (1732), his favorite resort being a natural recess in the rocks on the seashore. In 1733 he published his *Theory of Visual Language Vindicated*. The support promised by the government was never given to him, and he returned to England in 1732. In 1734 he received the bishopric of Cloyne, as a mark of favor from Queen Caroline. He was now once more in the enjoyment of leisure, of which he availed himself to write many works. In 1744 he gave the world his notions of the virtues of tar water, and his revised philosophical ideas, in a book entitled *Siris: A Chain of Philosophical Reflections*, etc. In this work he made an attempt to do philosophical justice to the element of permanence in experience, but it cannot be said that he succeeded in doing more than setting a problem for subsequent idealism. His last work was *Further Thoughts on Tar Water*, published in 1752. He was hypochondriacal for many years before his death, which occurred at Oxford, whither he had gone to live with his son, who was studying at Christ Church. A genial companion, an affectionate and steady friend, he was loved by all of his contemporaries who enjoyed his society, a graceful writer, a subtle philosopher, and an active churchman, his whole

life was devoted to usefulness and ennobled by the purity of his aspirations. On Berkeley's visit to America, consult M C Tyler, *Three Men of Letters* (New York, 1895). The best edition of his works is that of Fraser (2d ed, Oxford, 1902), one volume of which is devoted to his biography, consult also for a briefer biography, Fraser, *Berkeley* (London, 1881), and for philosophical criticism, Frederichs, *Ueber Berkeleys Idealismus* (Berlin, 1870), Spicker, *Kant, Hume, and Berkeley* (Berlin, 1875), Janitsch, *Kants Urtheil ueber Berkeley* (Strassburg, 1879), Penjon, *Etudes sur la vie et les œuvres philosophiques de Berkeley* (Paris, 1878), Sir L Stephen, *English Thought in the Eighteenth Century* (1902), G S Fullerton, *System of Metaphysics* (1904).

BERKELEY, MILES JOSEPH (1803-89) An English botanist. He was educated at Cambridge and was subsequently a curate at Margate and rural dean of Oundle and Welford. He wrote *British Algae* (1833), the concluding volume of *English Flora*, articles on diseases of plants and on vegetable pathology, an *Introduction to Cryptogamic Botany* (1857), *Outlines of British Fungology* (1860).

BERKELEY, SIR WILLIAM (*1610-77) A Colonial Governor of Virginia. He was born near London, and graduated at Oxford in 1629. He was appointed commissioner to Canada in 1632 and was considered to have had valuable Colonial experience in that capacity. In 1641 he was commissioned Governor of Virginia, and during the Civil War in England kept that Colony loyal to the King until 1651, when the adherents of Cromwell gained the ascendancy. A portion of the fleet sent to the Barbadoes was sent to Virginia in that year, Berkeley and his followers were forced to acknowledge Cromwell's rule, and Richard Bennett was appointed to succeed Berkeley. He remained in the Colony, however, and in 1660 was chosen Governor by the General Assembly, receiving his commission for the office from Charles II. He soon completely lost favor with the people by his arbitrary policy, his obstinacy, and his persistent refusal to furnish protection against the Indians, and a rebellion against him led by Nathaniel Bacon (qv) failed only because of the sudden death of its leader. His extreme severity to Bacon's followers attracted the attention of the King, a royal commission condemned his policy, he was forced to resign the governorship, and in 1676 returned to England. He was the author of *A Discourse and View of Virginia* (1683) and a drama, called *The Lost Lady* (1838).

BERKELEY (bér'li) DIVINITY SCHOOL. A Protestant Episcopal theological seminary. It was organized in 1851 by John Williams, fourth Bishop of Connecticut, when president of Trinity College, Hartford, Conn., as a theological department of the college. In 1854 the seminary was put upon an independent basis and established in Middletown, Conn. The chapel was built in 1851, and the library in 1866. The graduates on the roll of the seminary number (1913) 525, of whom 335 survive, including 20 bishops and many of the best-known clergymen of the Episcopal church. The value of the buildings and grounds is about \$100,000, and the endowment fund aggregates \$485,000. There are about 30,000 volumes in the library. Samuel Hart, dean.

BERKELEY SPRINGS. A town and the county seat of Morgan Co, W Va, 103 miles

northwest of Washington, D C, on a branch of the Baltimore and Ohio Railroad (Map West Virginia, F 2). It is a popular resort, frequented for its warm (74° F) mineral springs, which have medicinal properties. The town contains Mount Wesley Academy. Silica sand is extensively mined in the vicinity, and there are a sand pulverizing plant, a planing mill, handle and canning factories, and a large storage warehouse. Other industries of the town include the raising of tomatoes and fruit. Berkeley Springs was settled as early as 1775 and was incorporated in 1872. Pop, 1900, 781, 1910, 864.

BERKHAMPSTEAD, GREAT. See **GREAT BERKHAMPTSTEAD**.

BERKLEY. A town in Norfolk Co, Va, annexed in 1906 to Norfolk (qv).

BERKSHIRE (shorter *Berks*, the birches, AS *burc*, *beorc*, birch). A midland county of England, bounded north by Gloucester, Oxford, and Bucks, east by Oxford and Bucks, south-east by Surrey, south by Hampshire, and west by Wiltshire (Map England, E 5). Its area is 722 square miles, about three-fourths under cultivation. There is some excellent woodland, especially in the vicinity of Windsor. Other towns of importance are Reading, the capital, Maidenhead, and Newbury. The population is chiefly engaged in stock raising and agricultural pursuits. Pop, 1801, 176,119, 1901, 180,354, 1911, 271,009. Consult *Graves, The Way about Berkshire* (London, 1898).

BERKSHIRE HILLS. The name applied to the hill country of western Massachusetts (Map Massachusetts, A 3). The region is famed for the beauty of its scenery and is a favorite outing place in summer. The mountains, which are a continuation of the Green Mountains of Vermont, are intersected by rivers and valleys, which give variety to the scenery. The chief rivers on the west are the Hoosac and the Housatonic, and on the east the Deerfield and the Westfield. Few of the summits are over 2000 feet above sea level, but Greylock in the north rises to 3535 feet, and Mount Everett at the south rises to 2624 feet.

BERLAD, bér-lád'. A town in the district of Tutova, Rumania, situated on the river of the same name and on the Tecuci-Basul Railway (Map Balkan Peninsula, F 1). It is regularly built, and contains a hospital and a number of institutions for secondary education, and a theatre. It has a considerable trade in grain and timber and a number of distilleries. Pop, 1904, 24,404, 1912, 25,381.

BERLEBURG, bér'le-búrk, or **BERLEBURGER** (bér'le-búrk'ér) **BIBLE.** A translation of the Bible published by unknown editors at Berleburg, in Germany, 25 miles northwest of Marburg (8 vols, 1726-42). It is an original translation, with a running exposition, giving the literal, spiritual, and hidden or mystical interpretation. It has the characteristic excellences and defects of pietism.

BERLICHINGEN, bér'lik-ing'en, Gortz or GOTTFRIED VON (1480-1562). A German feudal knight and soldier of fortune. He was born at Jegsthausen, Wurttemberg, and was initiated into feudal warfare at an early age. He first served the Elector Frederick of Brandenburg, but soon took up the cause of Albert of Bavaria. In 1504, at the siege of Landshut, he lost his right hand, and having had it replaced by an iron one, he was thenceforth known as Gortz of

the Iron Hand. He lived in constant feuds with his neighbors and waylaid passing merchants, varying these pastimes with deeds of chivalry. His disregard for the edict against private warfare caused Goetz to be twice put under the ban of the Empire, first in 1512 and again in 1518. He was a staunch supporter of Luther. In 1525 the revolted peasants, according to his story, came to the castle of Berlichingen and insisted forcibly on his assuming command over them. The revolt was soon put down, and Goetz taken prisoner, and only released after two years' captivity and on promise of abstaining from further warfare. After a long period of inactivity he reappeared on the scene in 1542 and took part in the campaign in Hungary against the Turks, and in 1544 fought for Charles V against Francis I. Goetz died at his castle, July 23, 1562. While living in retirement he wrote his famous autobiography, which first appeared in 1731 and has since been edited by Schonhuth (Heilbronn, 1859) and by Muller (Leipzig, 1882). Goethe chose the famous knight as the hero of one of his best known dramas, *Goetz von Berlichingen*, which Sir Walter Scott translated, and in the eyes of historians generally Goetz represents the typical feudal knight. The best biographies of him are Goetz, Graf von Berlichingen-Rossach, *Geschichte des Ritters Goetz von Berlichingen mit der eisernen Hand* (Leipzig, 1861), Pallman, *Der historische Goetz von Berlichingen* (Berlin, 1894). The family of Berlichingen-Rossach are descendants of the famous knights.

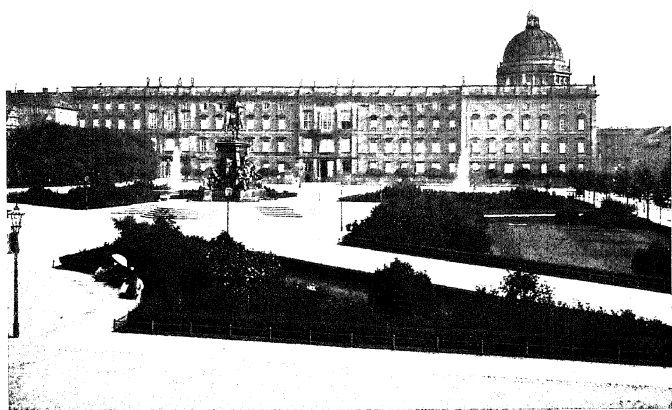
BERLIN, bër-lin', *Ger* pron bër-lën' (commonly explained as a word of the Wendish Slavs, which meant 'free or open space'). The capital of the German Empire and of the Kingdom of Prussia (Map German Empire, E 2). It is one of the finest and most important cities of Europe, the largest after London and Paris, and is situated on the river Spree, in lat 52° 30' N, long 13° 24' E. The city is 150 miles from Hamburg and 84 from Stettin. The Spree, at this place about 200 feet wide, with a sluggish current, flows through the city in a northwesterly direction, dividing it into two nearly equal parts, and it is connected with the Oder and the Baltic by canals.

Streets, Buildings, and Monuments. The divisions of Berlin are marked by the course of the natural waterways intersecting the city. Three of the older parts of the city, viz., Alt-Kölln, with its royal castle, Alt-Berlin, with the city hall, and Friedrichswerder and Neu-Kölln, with the arsenal and state bank—form the first circle around the centre which constituted the original city. Next follows a second concentric circle of seven parts, viz., Dorotheenstadt, Friedrichstadt, Friedrich-Wilhelmstadt, Königstadt, Spandauer Viertel, Stralauer Viertel, and Luisenstadt. A third circle is formed around the famous Thiergarten as a centre, and includes Moabit, Wedding, and the Oranienburg and Rosenthal suburbs on the north, and the Friedrich, Schöneberg, and Tempelhof suburbs on the south. Berlin is distinguished by a large number of imposing modern public edifices and by numerous splendid public monuments. Its most celebrated street is Unter den Linden (so called from its double avenue of linden trees), one of the finest and most spacious streets in Europe. It is entered from the Thiergarten through the celebrated Brandenburg Gate, the only one of the city gates left since the demolition of the city walls, erected in 1789-93 by

Langhans, in imitation of the Propylaea at Athens. It is 201 feet broad and nearly 65 feet high, it is supported by a double portico of 12 Doric columns, forming five passageways for carriages, and is surmounted by a Quadriga of Victory. An addition to the gate consists of two lateral colonnades, each supported by 16 columns. After Unter den Linden, the principal thoroughfares are the Friedrichstrasse, Leipziger Strasse, Potsdamer Strasse, Wilhelmstrasse, Königstrasse, and Kaiser-Wilhelmstrasse. Among the church edifices the new cathedral in Italian Renaissance, built in 1894-1905 on the site of the old cathedral, is the largest and most imposing. Its cost was 10,500,000 marks. The Gothic Klosterkirche, built by the Franciscans at the end of the thirteenth century, is one of the best-preserved specimens of mediæval architecture. Of modern churches, the Kaiser Wilhelm Memorial Church, in late Romanesque, erected in 1891-95, with its main tower 370 feet high, and the new cathedral (Der Dom), a sandstone edifice in Italian Renaissance (which replaces the old building demolished in 1893), with a dome and lantern rising to a height of 380 feet, are the loftiest structures in Berlin. Two other noteworthy ecclesiastical buildings are the Roman Catholic Church of St Michael, erected in 1853-56 as a garrison church, and the New Synagogue in a modified Oriental style, built in 1859-66, with a seating capacity of 3000, and distinguished for its interior decorations.

The most notable secular building is the Royal Palace, erected in the reign of Frederick the Great, and since the accession of William II the Imperial residence. It contains more than 600 rooms, of which the Old Throne Room, with its gorgeous rococo decoration, the White Salon, the Palace Chapel adorned with frescoes on a gold ground, and the Picture Gallery are the most beautiful. Opposite the palace is the Old Museum, a noble structure in Greek style, erected by Schinkel in 1824-28, in the rear and connected with it is the New Museum, in Renaissance style, built by Stüler in 1843-55. East of this rises the National Gallery in the form of a Corinthian temple. The arsenal, a square structure in late Italian Renaissance, built in 1694-1706, is remarkable for the fine sculptures adorning its exterior, notably the famous heads of Dying Warriors, executed by Schlüter. In its vicinity are situated the Königsruhe (Royal Guardhouse), in the form of a Roman *castrum*, and the Academy of Architecture, both by Schinkel, the latter one of his most original creations. In its skillful blending of mediæval structural forms with Greek details, it makes a happy combination, which may also be observed in the Schauspielhaus (Royal Theatre) by the same architect. In the centre of the city the imposing Rathaus (City Hall) attracts attention, and among other structures of more recent date may be mentioned the Exchange, the Deutsche Reichsbank in Renaissance, with fine color effects due to the judicious combination of sandstone and brick, the handsomely adorned Anhalter Railway Station, and the new Reichstags-Gebäude, so far the foremost architectural achievement in Berlin.

The city is adorned throughout with numerous statues of military heroes, the equestrian statue of Frederick the Great, the master creation of Rauch, being the most remarkable (see Plate RAUCH). Next in importance is that of the Great Elector,



BERLIN
THE ROYAL PALACE (UPPER)
THE BRANDENBURG GATE (LOWER)

an impressive work by Schluter, and among more recent works are the equestrian statue of Frederick William III by Woll, and the imposing national monuments to Emperor William I and to Prince Bismarck. Among the other public monuments the Column of Victory on the Königs Platz, commemorating the great victories in the campaigns of 1866 and 1870-71, is the most conspicuous. On the Schlossbrücke (palace bridge), the handsomest of the 73 bridges in Berlin, the eight marble groups of heroic size, illustrative of a warrior's life, are worthy of notice, so are the five statues of Prussian generals, by Rauch, adorning the square before the Opera House, and the Luther Monument on the Neue Markt. Of art treasures the Old Museum, which formerly housed the national gallery of paintings, contains a large collection of sculptures and a collection of northern antiquities. In the New Museum, which is one of the finest buildings in Berlin, there is a comprehensive and valuable collection of casts of ancient, mediæval, and modern sculptures, of importance also are the Egyptian Museum in this building, scarcely equalled by any similar collection, and the Cabinet of Engravings. The upper wall of the superb staircase, which occupies the centre of the building, is adorned with the famous mural paintings by Kaulbach, representing six great epochs in the history of mankind. The National Gallery contains over 1100 modern German paintings and cartoons, 233 sculptures, and 30,000 drawings and water colours. Near these buildings is the Pergamum Museum, which contains the collection made by Humann in his excavations at Pergamum. The Kaiser Friedrich Museum (1904) contains many of the treasures formerly housed in the Old and New museums, including the numismatic collection, sculptures of the Christian Era, and one of the finest collections of paintings in Europe. Other collections of interest are found in the Ethnological and Art Industrial museums. In the Ravene Picture Gallery, containing a series of choice works by modern French and German masters, and in the Hohenzollern Museum.

The educational institutions of Berlin, which is becoming the centre of Germany's intellectual life, are numerous and of a high order. Among the higher institutions of learning, in addition to the University of Berlin (see article), are the Institute of Technology, with its departments of Architecture, Architectural Engineering, Mechanical Engineering, Naval Engineering, Mines, Chemistry, and General Science, and nearly 4000 students, the Military Academy, the Artillery and Engineering School, the Royal School of Agriculture, the Royal Academy of Arts, Royal School of Music, School of Oriental Languages, etc.

Industry and Commerce. Of first importance are the cloth-printing and dyeing establishments, the iron and steel industry, and the manufacture of clothing, especially women's cloaks. In addition to these, railway cars and wagons, sewing machines, dynamos and all kinds of electrical apparatus, gold, silver, and bronze wares, pianos, musical instruments, toys, carpets, porcelain and earthen ware, beer, and nearly every article of domestic and industrial use are produced in Berlin's busy factories. The geographical position of Berlin makes it the natural emporium for the agricultural products coming from East Prussia, Austria, and Russia. It is the centre of the North German

railway system, 12 main lines of railway enter the city. The chief articles of commerce are grain, cattle, wool, timber, and coal.

Government and Administration. In the administrative system of Berlin the municipal council, composed of 144 members, is elected for a term of six years. The council elects the chief mayor (Oberbürgermeister) and the mayors, and is in general the source of governmental authority for the municipality except in those branches of administration which are under the direct control of the Prussian government. (For further details see *PRUSSIA, Local Government*.) The police organization is under the control of the Minister of the Interior, and is subdivided into six departments, as follows: general police, factory inspection, building inspection, criminal police, passport and labor bureau, market and mounted police.

The steady growth of the city and the increasing number of functions performed by the municipality have led to an increased city budget, which amounted to more than \$25,000,000 in 1900-01, to over \$33,000,000 in 1904-05, not including the income and expenditure of various city works, amounting to over \$12,000,000, and in 1910-11 it was about \$75,000,000. The total debt of the city amounted to \$351,000,000 in 1904. The numerous city improvements offset these items of expense and indebtedness. There is an extensive system of asphalt pavements. Two abattoirs erected in Berlin in 1883 at a cost of \$5,000,000 have supplanted about 1000 private slaughterhouses and make it possible to enforce every regulation for health under a very efficient and cheap service, besides yielding a net income to the city. The civic water works yielded in 1904 a net income of 5,000,000 marks (in addition to supplying what is used for public needs), after defraying all the costs of operation. The sewerage system is on the most modern hygienic plan, all the city sewage being conducted by means of a comprehensive system of sewers, to 18 sewage farms, each of which is under careful sanitary supervision. The chief product of the farms is milk. Berlin has a perfect system of street cleaning, thoroughly organized under municipal control. The city owns its gas plant. Its system of municipal market halls recently introduced supplements the other municipal institutions which enable the city officials to enforce strictly all the sanitary measures and protect the poor against impure food and extortionate prices. A system of parks and squares, 87 in number, provides breathing space for the most crowded portions of the city.

The rapid growth of the city led to great overcrowding of the poorer classes of the population in large tenements. Many were forced to live in cellars, which were damp and shut off from light. As a result there was an extremely high death rate, varying in different parts of the city with the nature of the dwellings. In 1873 the rate was 28 per 1000, and it continued to grow. In 1885 an exhaustive investigation was made into the connection between the death rate and the number of rooms occupied by a family. The results were startling, showing an extraordinary increase of the death rate with the crowding into narrow quarters. This caused the municipality to adopt a new code of building regulations in 1888, which has been instrumental in greatly improving the condition of the tenements and diminishing the

death rate, as seen from the following statistics of mortality 1885, 29 98 per 1000, 1890, 27 55, 1898, 18 16, 1903, 17 41. Total deaths in 1910, 30,152, 14 64 per 1000, 1911, 32,307, 15 59 per 1000 The decline in the birth rate of the city is notable In 1876 there were 240 3 births to 1000 married women, in 1880, 205, in 1890, 163 7, in 1900, 127, in 1903, 113 1, in 1904, 111 5 The birth rate of Berlin per 1000 was as follows

Year	Total	Living
1906	25 98	25 04
1907	25 56	24 63
1908	24 78	23 88
1909	23 29	22 42
1910	22 31	21 45
1911	21 04	20 84

A system of municipal lodging houses enables the authorities both to control the floating homeless population and to provide sanitary and cheap lodgings for the needy The poor-relief service is thoroughly organized under municipal control Berlin is divided for that purpose into 250 districts, with as many local committees to take charge of the work

The population of the city has increased with great rapidity From 202,000 in 1820, it grew to 411,000 in 1840, to 826,000 in 1871, 1,579,000 in 1890, 1,889,000 in 1900, and 2,071,257 at the census of Dec 1, 1910 Of the last number 1,089,118 were returned as Evangelicals, 243,020 Roman Catholics, and 90,013 Jews The city has an area of 63 41 square kilometers (24 43 square miles) Greater Berlin has an area of 356 465 square kilometers (137 631 square miles), and its population at the 1910 census was 3,974,300, in addition to Berlin, it consists of the Stadtkreise Charlottenburg, 23 43 square kilometers and 305,978 inhabitants, Neu-Kölln (formerly Rixdorf), 11 88 and 237,289, Schöneberg, 9 47 and 172,828, Deutsch-Wilmersdorf, 8 36 and 109,716, Spandau, 92 31 and 84,855, and the Landkreise Lichtenberg, 10 23 and 81,199, Niederbarnim, 1733 56 and 445,265, and Teltow, 1612 00 and 438,918 Of the total population, Evangelicals numbered 3,286,855, Roman Catholics 425,787, and Jews 144,527 The population of Berlin, April 1, 1912, was stated at 2,082,440

There is little authentic known of Berlin before the middle years of the thirteenth century. At this time on the site of the modern city were two towns, Berlin and Kölln They were united for a few years, beginning 1307, and then remained separate until 1432, and the union then effected was only short-lived Already, at the beginning of the fifteenth century, Berlin was one of the leading cities of the Middle Mark of Brandenburg, possessing extensive trading privileges, an independent mint, and its own courts of justice From the close of the fifteenth century it was permanently the residence of the margraves of Brandenburg The introduction of the Reformed religion in 1530, under the elector Joachim II, was the cause of many civil tumults, and the Thirty Years' War, in the course of which Berlin was besieged by the Swedes and the Imperialists, destroyed the growth of the town Its population declined from 12,000 at the beginning of the war to 6000 at the end, and its trade was practically brought to a standstill The town received new life from the Great Elector, Frederick William (1640-88), who rebuilt the deserted places, laid

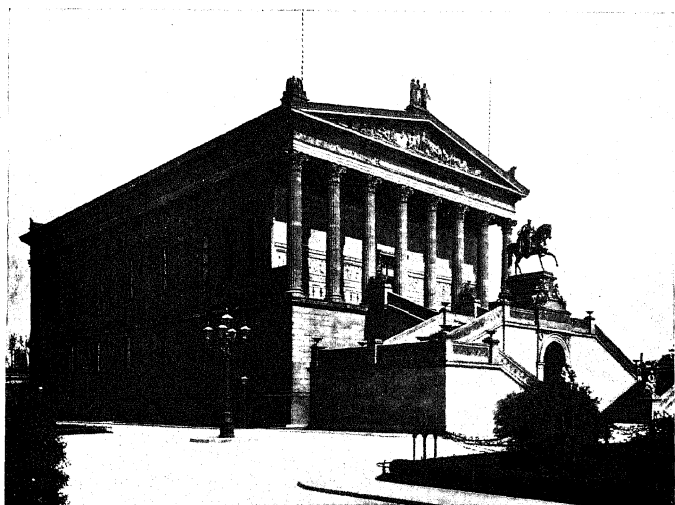
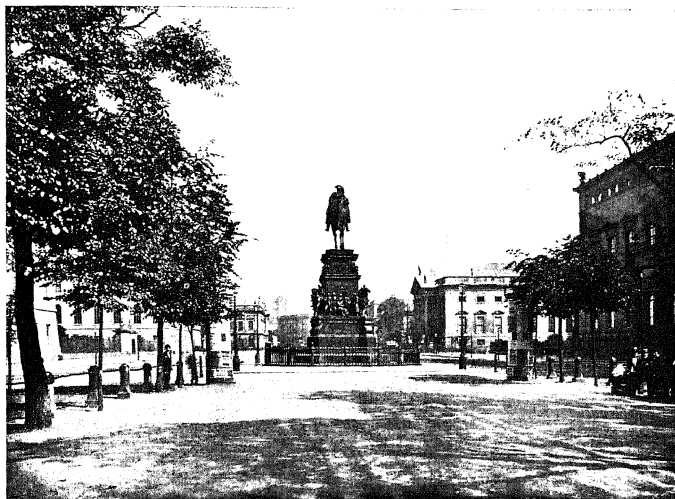
out suburbs, and surrounded the town with strong fortifications By the construction of a canal from the Spree to the Oder, he made Berlin an important centre of foreign commerce and shipbuilding, and he laid the foundation of its industrial prosperity by encouraging the settlement of immigrants from other countries, and especially of Huguenot refugees from France The population at the time of his death was about 20,000 The work of extending and beautifying the city was carried on by Frederick I, the first King of Prussia, and his successors In 1709 Kölln, together with the suburbs, Friedrichstadt, Friedrichswerder, and Dorotheenstadt, was united to Berlin Under the patronage of Frederick the Great large manufactures of silk and cotton grew up, and toward the end of the eighteenth century Berlin, from a garrison town and royal residence, had become rather an industrial centre Its growth continued steady in spite of its occupation by the Austrians in 1757, the Russians in 1760, and the French from 1806 to 1808 Under Frederick William III and Frederick William IV the limits of the city were extended, many public buildings erected, and numerous public institutions founded, chief among them the University of Berlin (1809). The last quarter of the nineteenth century was a period of tremendous growth in wealth and population, due in part to the great industrial development of the city, and in part to its position as the capital of the new and powerful German Empire This growth continued in the twentieth century and with it the most complete application of the science of civic government and public order

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BERLIN, bär'lin The county seat of Waterloo Co, Ontario, Canada, 62 miles west by south of Toronto, on the Grand Trunk Railroad (Map Ontario, C 4) It is the seat of St Jerome's College (R C), founded in 1865, and there are tanneries, button factories, a brewery, foundries, and manufactories of furniture, pianos, shoes, collars, shirts, etc. Pop, 1901, 9747, 1911, 15,196

BERLIN A town in Hartford Co, Conn., 11 miles (direct) south of Hartford, on the New York, New Haven, and Hartford Railroad (Map Connecticut, E 3) There are manufactories of paper goods and bricks Pop, 1890, 2600, 1900, 3448, 1910, 3728

BERLIN A city in Coos Co, N H, 98 miles northwest of Portland, Me., on the Androscoggin River, and on the Grand Trunk and the Boston and Maine railroads (Map New Hampshire, H 3) It is 16 miles from the base of Mount Washington and is surrounded by rugged mountains It has valuable water power, developing almost 20,000 horse power The principal industries are the manufacture of paper



BERLIN
UNTER DEN LINDEN (UPPER)
THE NATIONAL GALLERY (LOWER)

and sulphite pulp and lumbering. The city contains a public library, two theatres, a hospital, parochial and public schools, and a fine municipal building. Pop., 1890, 3729; 1900, 8886; 1910, 11,780.

BERLIN. A city in Green Lake Co., Wis., 97 miles, by rail, northwest of Milwaukee, on the Fox River, and on the Chicago, Milwaukee, and St. Paul Railroad (Map Wisconsin, E 5). It has granite quarries, dairy and cranberry interests, and manufactures of brooms, washboards, gloves, mittens, fur coats, shoes, bricks, and dairy and apary supplies. Settled in 1847, Berlin was first incorporated in 1856. It is governed under a charter, which provides for a mayor, elected biennially, and a city council. Pop., 1905, 4638; 1910, 4636.

BERLIN, CONGRESS OF. The European diplomatic conference which met at Berlin, June 13, 1878, to settle the Eastern Question (q.v.), and especially those phases of it which grew out of the Russo-Turkish War (q.v.). Temporarily restrained by the Crimean War and the Treaty of Paris of 1856, Russia had resumed, after the downfall of Napoleon III., her historic policy of intervention in the affairs of the Turkish Empire for the purpose of reaching the Mediterranean. The result was the Russo-Turkish War of 1877-78. The overwhelming success of Russia's armies filled with consternation the rivals of that Empire, and especially Austria-Hungary and Great Britain, with their interests in the Balkan States and the eastern Mediterranean respectively. When Russia wrung from the Porte the Treaty of San Stefano, Great Britain and Austria united in declaring it unsatisfactory, and in demanding a European congress to revise its provisions. Germany had hitherto kept out of the Eastern imbroglio, but her Chancellor, Prince Bismarck, now came forward with an invitation to the Powers to hold the congress in Berlin. The meetings were held at the Radziwill Palace, Bismarck's residence, and under his presidency. The delegates from Great Britain were Lord Beaconsfield, Lord Salisbury, and Lord Russell, from Russia, Prince Gortchakoff, Count Shuvaloff, and Baron d'Oubril, from Germany, Prince Bismarck, Prince Hohenlohe, and General von Bulow, from Austria-Hungary, Count Andrassy, Count Károlyi, and Baron Haymerle, from France, M. Waddington and the Comte de Saint-Valler, from Italy, Counts Corti and De Launay, and from Turkey, Karatheodori Pasha, Sadoullah Bey, and Mehemet Ali Pasha. Delegates from Greece, Rumania, Servia, and Montenegro attended the sessions in which their states were concerned, but were not members of the congress. Russia had been compelled to concede that the whole of the San Stefano Treaty should be taken up for consideration, and the congress revised or eliminated 18 of its 29 articles—all that had any political significance—and effected a rearrangement of the Eastern situation, using as a foundation the treaties of Paris (1856) and of London (1871). It reaffirmed the principle that the status of the Turkish Empire was to be decided by the Powers jointly, and not by any one of them. The provisions of the earlier treaties that were retained related to commercial questions. On the political side a new procedure was adopted, reaffirming emphatically the principle of nationality so far as the Balkan peoples were concerned. Rumania, Servia, and Montenegro were declared independent principalities. The tribu-

tary principality of Bulgaria and the autonomous province of Eastern Rumelia were carved out of the Turkish territory.

The first 12 articles related to Bulgaria (q.v.), which Russia had sought at San Stefano to erect into a state reaching from the Danube to the Aegean. The congress greatly reduced the area of the new state, but granted to Bulgaria autonomy and guarantees against Turkish oppression. The next 10 articles concerned Eastern Rumelia, a part of the proposed Greater Bulgaria. This was made a Turkish province, to be ruled by a Christian governor, but it soon took its destiny into its own hands and effected a union with Bulgaria. By Articles XXIII and XXIV the Porte agreed "scrupulously to apply in the island of Crete the Organic Law of 1868, with such modifications as may be considered equitable," and to rectify the Greek boundary. Article XXV placed Bosnia and Herzegovina under the administration of Austria-Hungary, although they remained under Turkish sovereignty. The independence, delimitation, and external relations of Montenegro were treated in seven articles, eight were taken up by a similar adjustment for Servia, and nine for Rumania. The Dobruja was given to Rumania, Servia received large accessions of territory (including Nish), Montenegro obtained Nikitch, Podgoritz, and Antivari. It was provided that the five fortresses in Bulgaria which had been the bulwark of Turkey against Russia—Shumla, Varna, Silistria, Rustchuk, and Vidin—should be dismantled. The Danube below the Iron Gate was neutralized, and Rumania was given a place upon the Danube Commission, which had been instituted in 1856. The congress allowed Russia to retain most of her conquests in Turkish Armenia—including Kars and Ardahan—as well as Batum, and reinstated her in the possession of the strip of Bessarabia which had been taken from her at the close of the Crimean War. It had been recognized that Russia would probably not yield the fruits of conquest in Asia, and on June 4, 1878, Great Britain had entered into a defensive alliance with Turkey, to take effect if Russia retained Batum, Ardahan, or Kars. Under this treaty Great Britain holds Cyprus for Turkey as a guarantee against further aggression by Russia in Asia. The fact of the practical acquisition of Cyprus by Great Britain and of Bosnia and Herzegovina by Austria-Hungary, while Russia was robbed of the fruits of her victory, has been a source of international bitterness not without effect on political relations since 1878. The remaining articles of the Treaty of Berlin imposed certain obligations upon the Porte, such as the guaranteeing of civil rights to non-Mohammedan subjects, and provided for sundry evacuations, confirmations, and ratifications. Russia opposed as strenuously as possible the course taken by the powers of Berlin, but to no avail. Bismarck and Germany were accused of having abandoned their traditional friendship for Russia.

Consult Hertlets, *The Map of Europe by Treaty*, vols. iii and iv (London, 1891), Holland, *The European Concert in the Eastern Questions* (Oxford, 1885), and *Studies in International Law* (Oxford, 1885).

BERLIN, RUDOLF (1833-97). A German oculist, born at Friedland (Mecklenburg-Strelitz). He studied at Göttingen, Berlin, and other universities, was connected as an instructor with the University of Tübingen and the Technical

Institute of Stuttgart, and in 1889 was appointed professor of ophthalmology at the University of Rostock. The results of his investigations concerning the presence of foreign bodies in the vitreous humor, the anatomy and pathology of the lachrymal gland, and other subjects, appeared in technical journals. He was among the first to make a systematic comparative study of the diseases of the eye, and in 1882 established a *Zeitschrift für vergleichende Augenheilkunde*.

BERLIN, UNIVERSITY OF One of the most important, though one of the youngest universities of the world. After the disasters of 1806 and 1807 in the war with Napoleon, King Frederick William III, in September, 1807, established in Berlin an academy or university, to which he called many of the most noted of German scholars, including some who had been connected with the University of Halle, suppressed by Napoleon. The brilliant success of the new university was due chiefly to Wilhelm von Humboldt (elder brother of Alexander von Humboldt), a scholar, statesman, and administrator. As first Minister of Education in 1808, he brought the direction and support of the university into the hands of the Ministry of the Interior and greatly enlarged its scope, and in 1809 the King, by royal order, finally established the university on its present basis. The chief feature of the new organization was the stress laid on securing men of the first order of ability to fill the professorial chairs. A yearly income of 150,000 thalers and the royal palace of Prince Henry were assigned to the foundation, and the university began its brilliant career. Its faculties comprise theology, jurisprudence, medicine, and philosophy (arts and science). It had in 1912 more than 14,000 students, of whom over 8000 were matriculated. These were divided as follows: theology, 415, jurisprudence, 2226, medicine, 1872, philosophy (philosophy proper, philology, and history), 4637, mathematics and science, 982, finance and administration, 308, pharmacy and dentistry, 222. The university also includes several "institutions," comprising the seminars, the institutes of physics and physiology, clinics, museums, and observatories. The university is supported by the state and is under control of the Minister of Education. The administration is in the hands of the rector and senate, the so-called "plenum" or full body of professors, and the faculties. A full account of the organization may be found in the article **UNIVERSITY**, section *German*, etc. It is enough to say here that the university is practically a self-governing body, with corporate freedom and responsibilities. It has police and judicial powers over its members, exercised by the administration and a university court. Men and women of all nationalities are admitted. The choice of professors for distinguished excellence is still maintained, and the long list of great scholars connected with the university includes, among others, the Grimm brothers, Hegel, Scherer, Bopp, Ranke, Niebuhr, Savigny, Lepsius, Karl Ritter, Dove, Gneist, Trendelenburg, Helmholz, and many more still on the roll of active teachers. The University Library consists of over 200,000 volumes and more than that number of university and school "theses," etc. The chief library facilities for students are to be found, however, in the Royal Library, which contains over 1,260,000 volumes and 33,700 MSS., including a collection of over 13,000

Oriental MSS. The libraries of the Reichstag (153,000 volumes), of the Royal War Academy (94,000 volumes), of the Royal Wilhelm Academy (62,000), and the Royal Prussian and Royal Secret Archives, and other collections, are also accessible. Since 1906-07 the University of Berlin has been exchanging professors with Columbia and Harvard universities, a system by which it maintains permanent chairs at these universities in return for an American professorship at home. The arrangement is in the hands of the Prussian government. The American chair at Berlin is known as the Theodore Roosevelt Professorship and the German chair at Columbia as the Kaiser Wilhelm Professorship. The *Academische Auskunftsstelle* was recently established as a bureau of information particularly for foreign students.

BERLIN BLUE See **HYDRO-FERROCYANIC ACID**.

BERLIN DECREE See **CONTINENTAL SYSTEM**.

BERLINE An old-fashioned, four-wheeled covered carriage, with a suspended body, seating two persons, having a seat behind covered with a hood. It owes its name to the fact that it was first made about the year 1670 in Berlin, Prussia, from designs furnished by the architect of the Elector of Brandenburg. The term is now applied to a form of closed body for the passenger motor vehicle, derived and expanded from the limousine, and having the front two seats enclosed and entrance to them effected through a full hinged door. The tonneau part is usually specially luxurious, and for five passengers. See **MOTOR VEHICLE**.

BERLINER, Ger. *pron* bëi-lë'nër, **EMILE** (1851-) A German-American inventor, born in Hanover. He studied in Wolfenbüttel, came to the United States in 1870, and in 1879-82 was chief instrument inspector of the Bell Telephone Company. In 1877 he invented the telephone transmitter, or microphone, known by his name, and constructed on principles independently arrived at by Hughes in England later in the same year. He also invented the gramophone or disc talking machine and a method of duplicating disc records. He planned and was a member of the Washington Milk Conference of 1907.

BERLIN PHIL/HARMONIC See **PHIL-HARMONIC SOCIETIES**.

BERLIOZ, bër-lë'öz, Hector (1803-69) A French composer. He was born at La Côte-Saint-André, Dec. 11, 1803. His father, a physician, sent him to Paris to study medicine, but he entered the Conservatory, which he soon left, finding the teaching too pedantic. He gave himself up heart and soul to the romantic movement and became the champion of "programme music"—which endeavors to tell a story in music. Of his earlier attempts in this line, the *Symphonie fantastique, épisode de la vie d'un artiste* (1828), a page of musical autobiography, is the most remarkable. Coveting the Prix de Rome, he resumed study in the Conservatory under Lesueur (qv) and gained the prize with the cantata *Sardanapale* (1830). Life in Italy furnished inspiration for a new unfolding of his gifts, and he wrote the overture to *King Lear*, and the symphonic poem *Lélio, ou le retour à la vie*, a companion piece of the *Fantastic Symphony*. He now took up journalistic work in the *Correspondant*, then in the *Courrier de l'Europe*, in the *Revue Européenne*, and finally in the *Gazette*

musicale de Paris and the *Journal des débats*. His brilliant and powerful style, iconoclastic tendencies and unswerving honesty and candor, made him the principal figure in French musical life. Though made conservator in 1830 and librarian in 1852, he never became professor at the Conservatory. His symphony, *Harold en Italie* (1834), his *Messe des morts* (1837), his *Caraval romain* (overture), and the dramatic symphony, *Roméo et Juliette* (1839), all elicited high praise from the critics, but his first opera in two acts, *Benvenuto Cellini* (1838), was a failure. In 1843, encouraged by Liszt's propagation of his music, Berlioz undertook a tour of Germany, which was so successful that for some ten years he traveled through Austria, Hungary, Bohemia, Russia, and England, everywhere meeting with enthusiastic receptions. In Hungary the "Rákóczy March," from his *Damnation de Faust* (1846), is said to have aroused the people to a patriotic frenzy. In London he conducted the New Philharmonic Concerts and in 1853 his own *Benvenuto Cellini* at Covent Garden. He was elected to the Academy in 1856. His masterpiece, *Les Troyens*, consisting of *La Prise de Troie* (three acts) and *Les Troyens a Carthage* (five acts), proved a failure (Paris, 1863), which broke down the composer, and he was feeble throughout the rest of his life. In 1890 *Les Troyens* was produced in Karlsruhe, in 1899 in Moscow, and in 1900 in Paris, with signal success. His writings on musical matters and the art of music are among the most treasured works in this line. His *Traité d'instrumentation* was the theoretical exposition of his views on instrumentation, which he applied in practice, and until the last years of the century was the best work of its kind. In 1905 Richard Strauss edited a new German translation copiously annotated and enlarged so as to include the most recent instruments. Only after his death his compatriots came to think that he had not received his due honor, and they tried to make amends, which brought upon them the accusation of desiring to form a Berlioz cult. Berlioz lacked one essential—melodic invention—and all his ingenuity and art could not conceal the poverty of his musical ideas. But he was a great master in all else. His grandiose fancy conceived images that are often sublime. He possessed an accurate knowledge of the possibilities of every instrument, which enabled him to produce new and wonderful combinations, enchanting, dazzling, weird, bizarre, or elf-like (as, e.g., the "Queen Mab Scherzo" in *Roméo et Juliette*, or in the *Danse des sylphes*), and he is now the acknowledged father of modern orchestration. In spite of the enthusiasm and devotion on the part of some eminent conductors (notably Lamoureux, Colonne, and Mottl) the public has always maintained a respectful aloofness towards the works of Berlioz. Yet this master's place in the history of music is one of the greatest importance. His influence on the advance in orchestral technique cannot be overestimated. The subsequent progress in the art of instrumentation made by Wagner, Liszt, and Richard Strauss has been entirely on the solid foundation laid by Berlioz. The Fantastic Symphony is the first work of Programme Music (qv) in the modern acceptance of the term. Liszt's form of the Symphonic Poem was consciously evolved on the principles laid down by Berlioz. Thus it is seen that the Tone Poems of Richard Strauss—the last word in instru-

mental music, and, as it now seems, the highest possible development of programme music—are the result of a direct evolution beginning with Berlioz. His collected writings appeared in Geiman translation by Richard Pohl in four volumes (1864). Under the editorship of Charles Malherbe and Felix Wengartner, Breitkopf, and Hartel of Leipzig are bringing out a complete edition of the compositions and literary writings in 17 volumes. Consult A. Julien, *H. Berlioz* (Paris, 1888), Hippeau, *Berlioz, l'homme et l'artiste* (Paris, 1883-85) and *Berlioz et son temps* (Paris, 1892). Pohl, *H. Berlioz: Studien und Erinnerungen* (Leipzig, 1884), and Hector Berlioz, *Leben und Werke* (Leipzig, 1900), the autobiography, *Mémoires* (Paris, 1870, Eng. trans. Rachael and Eleanor Holmes, London, 1884), J. G. Prodhomme, *Hector Berlioz, 1803-1869* (Paris, 1905).

BERM. *berm* (Fr *berme*, probably of Germanic origin, cf Ger *Breme*, border, Eng *brim*). In fortification, a ledge or pathway constructed at the bottom of the exterior of the outwork or rampart, where it joins the scarp or inner side of the ditch. It is from 3 to 8 feet in width and is almost on a level with the natural surface of the ground. Besides serving as a passageway for troops manning the defenses, it serves in part to prevent the filling up of the ditch with earth and debris, when the rampart is battered by the besiegers. (See **FORTIFICATION**.) In civil engineering the bank of a ditch or canal, especially if elevated, is sometimes referred to as the berm.

BERMEJO, *ber-má'ho* (the "id" river owing to the color of its waters). A river of South America which rises in southeastern Bolivia and flows through Argentina toward the Paraguay, which it joins near Nuevo Timbo at a short distance above its junction with the Paraná (Map Argentina, E 9). Its total length, including windings, is nearly 1300 miles, and it is navigable in its middle course for over half this distance for small steamers at all seasons, and for heavier craft for only about six months of the year. A United States government boat, the *Waterwitch*, commanded by Thomas Page, explored its course in 1883 after arduous navigation up the Paraguay River. Since the middle of the last century the waters of the Bermejo have in their middle course mainly flowed through the parallel channel—the Río Teneo—about 10 miles south of the old channel.

BERMONDSEY, *ber-mond-zí* (AS *Beormondstg*, Beormond's island). A district of Greater London (qv).

BERMONDSEY SPA (*spa*) **GAR'DENS**. A fashionable resort near London in George II's reign. The principal industry is that of tanning, the whole borough being densely populated.

BERMUDA. See **BERMUDA ISLANDS**.

BERMUDA GE'DAR. See **JUNIPER**.

BERMUDA GRASS (so called by reason of its southern origin, of its other name, Bahama grass), *Cynodon dactylon*. A perennial grass, probably a native of India, which has become introduced throughout the warmer portions of the globe. It is a low, creeping plant, rooting at the joints. In poor soils the leaves are short, and it sends up short flower stalks, which divide into from 3 to 7 slender divergent spikes. In good soil it is often 1 to 2 feet high. The rootstocks run everywhere, soon making a dense sod. It is extremely resistant to

heat and drought, and is valued in warm regions for grazing, since it remains green after all other species are dry. It grows readily on sandy soils and is valuable in the Southern States as a lawn grass. The plant tuns blown with the first frosts, although it is hardy in the latitude of Philadelphia. Its rooting habit makes it very difficult of eradication when once established. Bermuda grass will grow in almost any soil, unless too wet, but does not stand shade. It does not mature its seed in the United States, except in the extreme Southern States. It is also propagated from the rootstocks.

BERMUDA HUNDRED. A peninsula in Chesterfield Co., Va., formed by the confluence of the James and the Appomattox rivers. The population of the district of this name was 2044 in 1800, 2105 in 1900, and 2554 in 1910. Bermuda Hundred was the scene of much sharp fighting during the Civil War. General Butler landed here with a Federal force of about 35,000 (the "Army of the James") early in May, 1864, in order to cooperate with Grant against the Confederate army of Northern Virginia under General Lee. He was confronted by General Beauregard, however, with an almost equal force, and on May 16 fought with him the battle of Drury's Bluff, in which the Federal loss was about 4000 and the Confederate about 3000. Though no other engagement of any consequence occurred in this vicinity, there was almost continual skirmishing until the 30th. Meanwhile Butler sent part of his troops to reinforce Grant and was himself kept closely confined at Bermuda Hundred. For an account of the battle of Drury's Bluff, consult Johnson and Buel (ed.), *Battles and Leaders of the Civil War*, vol. iv (New York, 1887).

BERMUDA (named after their discoverer), or **SOMERS** (sūm'ez), **ISLANDS.** A group of small islands and reefs in the west Atlantic, belonging to Great Britain and situated between lat 32° 14' and 32° 25' N and long 64° 38' and 64° 52' W, about 675 miles southeast of New York, and about 500-600 miles east-southeast of Cape Hatteras, North Carolina (Map America, North, M 6). It lies on the route from Europe to the West Indies and derives additional importance from its position midway between the West Indies and the British possessions in North America. The group, including the uninhabited islets and reefs, numbers about 350 islands, of which, however, only about 20 are inhabited. The total area of the group is about 12,000 acres, of which Bermuda, or the main island (about 9000 acres), St. George, Somerset, and Ireland occupy the larger part. The islands are of coralline formation, composed mostly of white limestone, and are surrounded by numerous reefs, which make navigation dangerous. The highest point of land is 260 feet. There are no streams, and the fresh-water supply is dependent on rains. Beautiful scenery, luxuriant vegetation, and other varied attractions, combined with a healthful and equable climate, make the islands favorite summer and winter resorts with Americans. During the winter the temperature ranges from about 50° in the morning to about 70° at midday. In the summer 87° is about the maximum. Frosts are unknown, and the ocean winds are tempered by the Gulf Stream. The soil is of remarkable fertility, and the climate is very favorable to vegetation. The chief products are sweet potatoes, onions, and other early vegetables, bananas, arrowroot, and some corn. The agricultural

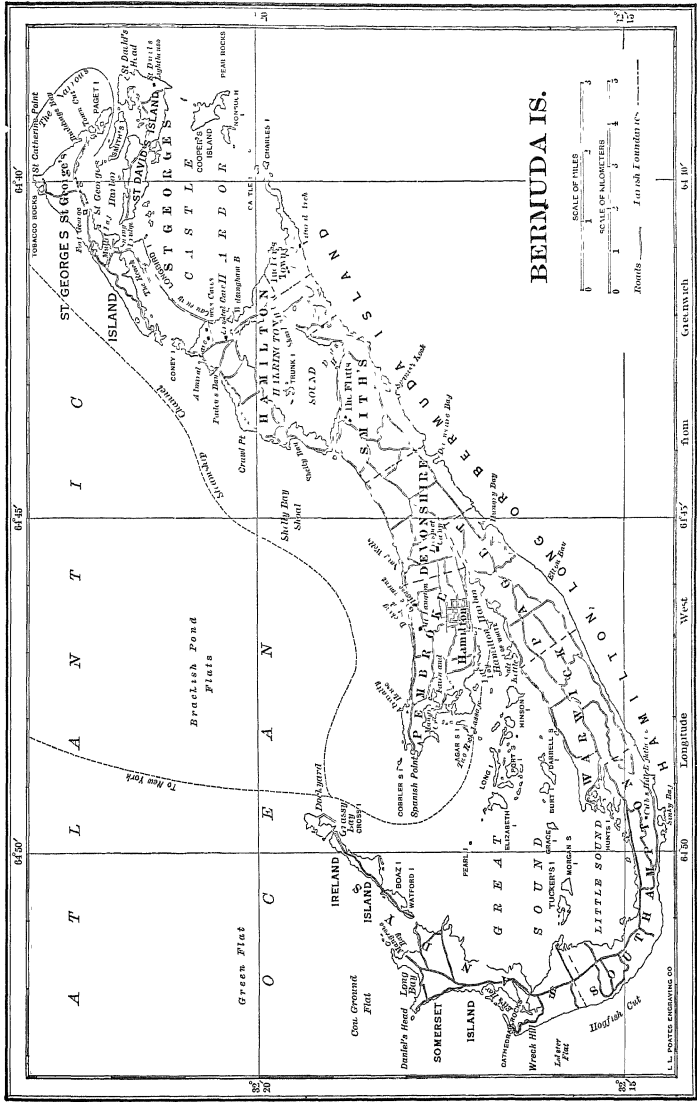
products go mostly to the United States and Canada, the value of the total exports having been £134,033 in 1911, and of the imports, £845,540. The islands produce also large quantities of lily-bulbs and lilies, which are shipped to the United States. Revenue and expenditure amounted for 1911 to £79,248 and £90,100, respectively.

The group is regarded as of considerable strategical importance and is strongly fortified. It is the winter naval station for the British North Atlantic and West Indian squadron and has a garrison of over 2500 men. The capital is Hamilton, on Bermuda, with 2627 inhabitants in 1911. The extensive naval establishment, dockyards, and floating dock are on Ireland Island. St. George, once the seat of government, is still of considerable importance as a trade centre. The administration of the group is in the hands of a governor, who is assisted by two councils, appointed by the crown, and by an assembly of 36 elected members. The total population of the group in 1911 was 18,944 (not counting the military)—6691 white, 12,303 colored. The Bermudas were discovered by the Spaniard Juan Bermudez, in 1515, and were first settled by Sir George Somers in 1609. They were colonized chiefly from Virginia and received additional immigrants from the United States during the Civil War. During the South African War (1899-1902) a number of Boer prisoners were held there.

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BERMUDEZ, bër-moŭ'däs. A maritime state of Venezuela. (q v.)

BERN, bër'n, *Ger. pron bër'n* (according to local tradition, many bears, *Ger. Bärn*, were killed on the day of the founding of the city). The capital of the canton of the same name and Federal capital of Switzerland since 1848. It is situated on a lofty sandstone promontory nearly 1800 feet above sea level, formed by the winding Aar, 80 miles northeast of Geneva (Map Switzerland, B 2). The river surrounds it on three sides and is crossed by several bridges, one of which is a magnificent stone structure, upward of 900 feet long, with a central arch 150 feet wide and 93 feet high. The fourth side was defended by fortifications, but these have been converted into public walks. It is one of the best and most regularly built towns in Europe and the finest city in Switzerland. Many of the houses are massive structures of freestone, resting upon shop-lined arcades, which furnish covered walks on both sides of the street. Rills of water flow through the streets, which are also adorned with numerous fountains. There are many fine public promenades in the environs. The minster terrace, supported by walls 100 feet high, is planted with trees and has a statue of the city's founder, Berthold von Zahringen. Among the principal public buildings are a Gothic minster, founded in 1421, with some interesting tablets and relics, fine stained windows, and a tower over 300 feet high, completed in 1894, the theatre, natural history, his-



torical, and art museums, the Municipal and University Library of over 200,000 volumes, the Bundeshaus, or Federal Palace, an edifice in Florentine architecture, the Swiss National Library of 120,000 volumes, a magnificent domed structure, designed to accommodate the archives of the Swiss Diet and administration, the mint, several hospitals, and the university (See BERN, UNIVERSITY OF.) There are various scientific, musical, and social societies, and benevolent institutions. An immemorial usage has decreed that the municipality maintain several bears, which are kept in the Buengraben, or Bears' Dens, on the right bank of the Aar. The city gets water for its drinking supply, and for the motive power of its electric plants, by means of a dam 1000 feet long across the Aar. There is little industrial activity, but the manufactures include woollens, silks, and cotton goods, scientific instruments, machinery, chocolate, etc. It has two great annual fairs and a large cattle and horse market. There are street railroads with compressed air and electricity as motive power. Steam roads run to the suburbs. The streets are lighted by electricity. Pop., 1900, 65,300; 1910, 85,264. At Bern is located the central office of the International Postal Union, and in 1909 in the Kleine Schanze there was erected a monument to that organization.

The Franks subdued the present canton of Bern in the early part of the sixth century. The region became part of the Kingdom of Transjurane Burgundy in 888, afterward formed part of the Kingdom of Arles, and about 1034 was united with the German Empire. In 1191 Berthold V, Duke of Zähringen, founded the town of Bern, and upon his demise without issue in 1218, it attained the position of a free Imperial city. From the beginning the inhabitants of the city showed themselves bold in the defense of their rights and the extension of their power. They fought against the Hapsburgs and the Burgundians, and succeeded in finally establishing their ascendancy by victories in 1298 and 1339. By conquest and purchase the burghers of Bern increased their possessions until, at the height of its power, toward the end of the sixteenth century, Bern ruled over one-third of the present territory of Switzerland and held the leading place in the Swiss Confederacy, which it had joined in 1353. The government of the town from early times was democratic in character, with the legislative and executive authority vested in councils elected by the burghers, but about the middle of the sixteenth century a decided tendency toward aristocratic domination set in, the right of citizenship was restricted, and the power of the state finally came to rest with a small number of wealthy families and the privileged guilds. Toward the rural districts which it ruled the town adopted a policy of consistent selfishness. It refused them all political rights and repressed insurrections among its disaffected subjects with great cruelty. The invasion of Switzerland by the French in 1798 overthrew the aristocratic régime and freed Vaud and Aargau from the domination of Bern. The struggle that went on throughout the nineteenth century between the Liberals and Conservatives resulted in the substantial victory of the former party. The power of the Church was limited, the state constitution was repeatedly revised in a democratic sense, and after 1870 the principle of

the referendum was developed with great completeness. Consult Muhlen, *Bern's Geschichte, 1191-1891* (Bern, 1891), and Haendcke and Mueller, *Das Münster in Bern* (Bern, 1894).

BERN, *bër'n*, *Ger. pron bër'n* (Fr. *Beune*). The second in area and the most populous of the cantons of Switzerland, situated in the northwestern part of the country, bordering on France on the north and west (Map Switzerland, B 2). Its area is 2558 square miles. The capital is Bern. The canton belongs geographically to two mountain systems. The Jura ranges cover its northeastern part, while the Alps traverse the southern portion. Bern belongs to the basin of the Rhine and is watered chiefly by the Aar and its tributary, the Emme. The chief lakes are Thun, Brienz, and Bienna. The canton is essentially agricultural and is one of the best cultivated portions of Switzerland. In the lower parts wine, grain, and fruit are grown, while in the mountain regions more attention is paid to cattle raising and to dairy industries. The mineral products include iron, granite, gypsum, and turf. Mineral springs are abundant, and there are numerous mountain resorts in the southern part of the canton. Among the most important industries are the manufacture of textiles, watches, and metal ware. In spite of the mountainous character of its surface the canton has good transportation facilities.

The form of government is purely democratic. The Grossrath, elected by the people at the rate of one member to every 2500 inhabitants, is the sole legislative body, while an executive council of nine members, since 1906 elected by direct popular vote, is intrusted with the executive part of the administration. Members of both houses serve four years. Every financial transaction involving more than 500,000 francs must be submitted to a referendum. For administrative purposes the canton is divided into 30 districts, administered each by a prefect elected by the voters of the respective districts. The supreme court of the canton consists of 15 members appointed by the Grossrath for four years. Primary education is compulsory, and the expenses are borne by the communes. The university of Bern (*q v.*), a polytechnical school, and a number of gymnasia and pro-gymnasias provide higher and secondary education. Pop., 1900, 590,914, *de facto* (*de jure*, 589,433), census of Dec 31, 1910, 647,235 (645,877). Nearly 90 per cent of the inhabitants are Protestants, and the remainder Catholics, with the exception of a few Jews. The German language is spoken by about 85 per cent of the population, and French and Italian by the majority of the remainder. For history, see BERN (*city*).

BERN, CONFERENCE OF, or DISPUTATION OF. A conference held in 1528, which led to the establishment of the Reformation in Bern. Some years before the Bishop of Lausanne demanded the indictment of certain preachers of Reformed doctrines, but the city council refused to interfere. The conflict increased steadily until, on Nov 27, 1527, the great council of the city decided to settle the disputes by appeal to the Word of God. Invitations were sent to the bishops of Constance, Basel, Lausanne, and Valais, and all the Swiss cantons were asked to send delegates and learned men. The bishops declined, and Charles V advised trust and recourse to the anticipated general council. But the Bern Council was held, Jan 5-26, 1528, and

as the result Bern went definitely over to the side of the Reformation. The local reformers were Francis Kolb and Beithold Halle, who drew up the 10 theses for the debate, but Zwingle was present and helpful.

BERN, UNIVERSITY OF. Originally a local school, enlarged about 1528 by the addition of advanced classes, particularly in theology, to meet the increased demand for such instruction made by the Reformation. Early in the eighteenth century chairs in science, medicine, and law were added. The Napoleonic period seriously affected the university, as it did others near to the French frontier, but in 1834 it was reorganized and is now a state institution. It has an income of about 900,000 francs and an endowment of 1,000,000 francs. Its 1800 students include over 300 women and are divided among the faculties of evangelical theology, Catholic theology, philosophy, law, medicine, and veterinary medicine. The library was incorporated in 1905 with the city library of Bern, and numbers over 200,000 volumes.

BERN CONVENTION. See LITERARY PROPERTY.

BERNACCHI, LOUIS CHARLES (1876-) An English scientist and explorer, born in Tasmania and educated at Melbourne University. After serving as physicist to the Southern Cross Antarctic Expedition in 1898, he came to England in 1900, and in the following year became physicist to the Discovery Antarctic Society. He traveled in British Namaqualand and German Southwest Africa in 1905, and in 1906 explored the upper Amazon basin in Peru. In 1910 he was a candidate for Parliament from Lancashire. He is the author of various scientific articles and also of *To the South Polar Regions* (1901).

BERNADOTTE, *Pi prou* bër'na-döt'. See CHARLES XIV JOHN, KING OF SWEDEN.

BERNALILLO, bër'na-lé'yó. A town, and the county seat of Sandoval Co., N. M., 16 miles north of Albuquerque, and on the Atchison, Topeka, and Santa Fe Railroad, on the Rio Grande (Map New Mexico, C 3). It has a convent and academy for girls and a Christian Brothers school. Near by are the Indian pueblos of Sandia and San Felipe. Fruit growing is the leading industry of the surrounding region, and there are important mining interests. Flour is the principal manufactured product. Pop., 1900, 790, 1910, 970.

BERNARD, bër'naid or bër'naid'. *Pi prou* bër'na'r', SAINT (1091-1153). A learned Roman Catholic ecclesiastic. He was born of noble parents at Fontaine, near Dijon, in Burgundy, 1090 or '91, was educated at court, but withdrew with his four brothers and some friends into seclusion for six months, and then became a monk of Cîteaux, in 1113, founded a new monastery, of that order, which was called the Cistercian, at Clairvaux in Champagne, lived in the monastery, and himself became its first abbot, in 1115. His ascetic life, solitary studies, and stirring eloquence made him during his lifetime the oracle of Christendom. He was honored with the title of the "Mellicious Doctor," and his writings were termed "a river of paradise." Although a mystical theologian, he was a man of eminently practical mind. He was consulted largely by the potentates of his day upon politics of state and exercised great influence with the Popes of his time. In 1128 he gave the rule to the Knights Templars and

was then ardent advocate. He took a deep interest in the Christian occupation of the Holy Land, and so, when disaster came upon the Christians there, he preached a second Crusade, which started in 1147. Charged by the Pope to excite the religious zeal of the people of France and Germany, he accomplished his mission with fatally memorable success. Fields, towns, cities, and castles were in many places almost depopulated, and innumerable legions, fired by his prophetic eloquence, hurried to the East, nine tenths of whom never saw their homes again. He prophesied their success, but when, instead, the news of the failure of the Crusade reached Europe, he fairly sank under the weight of the depression which fell upon him. He died Aug. 20, 1153, and was canonized by Alexander III in 1174.

Bernard's writings are regarded as among the most exalted in the whole range of mystical theology. He is one of the most notable exponents of the contemplative theology of the Mediaeval Church, and he ranks in this regard with Hugh and Richard of St. Victor and St. Bonaventure. He was a stalwart opponent of the rationalism of Abelard. Luther says of St. Bernard: "If there ever lived on earth a God-fearing and holy monk, it was St. Bernard of Clairvaux." He was one of the most enthusiastic advocates of monasticism. His writings are exceedingly numerous. They consist of epistles, sermons, and theological treatises. Of the first, we possess 439, of the second, 340, and of the third, 12. They are all instinct with genius, though it is difficult for us now to appreciate their extraordinary influence. Several of his hymns, e.g., "Jesus, the Very Thought of Thee," "O, Sacred Head, Now Wounded," are found in our hymn books. The best edition of the works of St. Bernard is that of Mabillon, printed in Paris in 1890 (2 vols.), reprinted in Venice (6 vols.), in Paris in 1835-40 (4 vols.), and again in 1854 (4 vols.). The monks of the reformed branch of the Cistercians, which he instituted, are often called, after him, Bernardines. He gave name also, in France, to the nuns of the Cistercian Order, which his sister, St. Humbeline, is said to have founded.

A complete French translation of his works appeared in Paris (8 vols.), 1873. His letters were translated into English by Samuel J. Eales, D.C.L. (2 vols., London, 1889), as the opening volumes of a complete English translation, *M. Eales also published a translation of Bernard's Cantica Cantorum*, 86 sermons on the Song of Solomon (1895), from these 31 sermons were selected and published in English translation, *The Song of Songs* (1901). Other modern English translations are *The Holy War*, by S. R. Maitland (Gloucester, 1827), *Four Homilies upon the Incarnation* (1843), *Letter on Conversion* (London, 1850), *Sermons for the Seasons of the Church* (1861), *The Jubilee Rhythm on the Name of Jesus* (1867), *The Glories of the Virgin Mother and Channel of Divine Grace* (Boston, 1867), *How to Live Well* (Oxford, 1886). For the biography of St. Bernard, consult Neander (Berlin, 1813, new ed., Götting, 1889), Eng. trans., London, 1843), Morrison (London, 1893), S. J. Eales (London, 1890), Ratisbonne (Paris, 1841, Eng. trans., New York, 1878), R. S. Storrs (New York, 1892), E. Vacandard (Paris, 1895), W. J. Sparrow-Simpson (London, 1895), T. Halusa (Regensburg, 1898).

BERNARD OF CLUNY, *klun'ē* (c 1122-56) A Benedictine monk, under Peter the Venerable He was born of English parentage at Morlaix, in Brittany, hence he is called sometimes Bernard of Morlaix, or, in Latin form, Bernardus Morlanensis. No details of his life are known. Yet he has attained immortality in hymnology, owing to the circumstance that, in the opening of his Latin poem "De Contemptu Mundi," he gives a description of heaven, which in the translation of John Mason Neale became the three beautiful hymns, "Jerusalem the Golden," "The World is Very Evil," "For Thee, O Dear, Dear Country." The poem itself is by no means heavenly in its general contents, but is a fierce castigation of the sins of the mediæval Roman church. It is 3000 lines of dactylic hexameters of such extraordinary difficulty that the author says he was only enabled by divine help to produce them. There are several early and scarce editions of the original text, and one modern one in the Rolls series in the second volume of Thomas Wright's *Anglo-Latin Satirical Poets of the Twelfth Century* (2 vols., London, 1872). For the translations referred to, consult J. M. Neal, *The Rhythm of Bernard de Morlaix on the Celestial Country*, Latin and English (London, 1859, 7th ed., 1866), Jackson, *Source of "Jerusalem the Golden"* (Chicago, 1910).

BERNARD, CHARLES DE (1804-50) (Pierre Marie Charles de Bernard du Gail de la Villotte) A French author, born on February 25, 1804, at Besançon. He at first studied for the law, but later entered the field of journalism. His work in connection with a critical review of Balzac's *Peau de chagrin* brought him to the favorable attention of that author, who advised him to develop his literary talent. Bernard then wrote many striking narratives dealing with French provincial life, chief among which was *Geifaut*, published in 1838. A volume of his short stories (*Le Nœud*) contained *Une aventure de magistrat*, which furnished Sardou with the material for his comedy of the *Pommes du voisin*. *Les ailes d'Icare* (1840), *La peau du lion* (1841), and *Le gentilhomme campagnard* (1847) are among the best of Bernard's other writings. He collaborated with C. H. L. Laurenot in the production of two comedies, which were included in the 12 volumes of his *Œuvres complètes*, published after his death. An appreciative criticism of Bernard appears in Thackeray's *Paris Sketch-Book*, as does also one by Henry James in his *French Poets and Novelists* (1878).

BERNARD, bër'nar, CLAUDE (1813-78) A French physiologist. He was born at Saint-Julien, near Villefranche, in the department of Rhône, July 12, 1813. He studied medicine in Paris, was admitted in 1839 as a surgical interne in one of the hospitals, and in 1841 became one of Magendie's assistants at the Collège de France. He was graduated in 1843 a doctor in medicine, and 10 years later a doctor in science, and was appointed in 1854 to the chair of general physiology in connection with the Faculty of Sciences in Paris. The same year he was chosen member of the Academy of Sciences, and in 1855 he succeeded Magendie as professor of experimental physiology in the Collège de France. Bernard's first researches were devoted to the physiological study of the various secretions of the alimentary canal. His memoir, published in 1844 in the *Gazette médicale*, treats

of the origin and functions of the gastric juice. To the *Comptes rendus* of the biological society he contributed papers on the saliva, on the intestinal juice, on the influence of the nerves on the digestive apparatus, and on the respiratory and circulatory systems. In his first original paper, *Researches on the Function of the Pancreas*, he showed that organ to be the true agent of the digestion of fats. This essay obtained in 1849 the grand prize of the French Academy in experimental physiology and was printed in the *Comptes rendus* of the Academy of Sciences in 1856. In 1849 appeared his first researches on the glycogenic function of the liver, proving that the blood which enters the liver does not contain sugar, while blood which leaves that organ by the hepatic vein is charged with it. He also showed that the formation of sugar in the liver could be interrupted by division of the pneumogastric nerve, and that a puncture of the floor of the fourth ventricle of the brain produced diabetes. For these discoveries, then keenly criticised, but now accepted, he obtained, in 1851, the grand prize of the French Academy in experimental physiology. In 1852 he published his experimental researches on the great sympathetic system, and on the influence exerted by division of the sympathetic nerve on animal heat. This paper procured him for the third time the prize of experimental physiology, in 1853. From 1854, when he succeeded Roux as member of the Institute, he continued his researches on the glycogenic function of the liver and also published his courses of lectures at the Collège de France on *Experimental Physiology in its Application to Medicine* (1855-56), on *The Effects of Toxic and Medicated Substances* (1857), on *The Physiology and Pathology of the Nervous System* (1858), on *The Physiological Properties and the Pathological Alteration of the Various Liquids of the Organism* (1859), on *Nutrition and Development* (1860), and his *Introduction to the Study of Experimental Medicine* (1865). In 1862 he became an officer in the Legion of Honor, in 1867 a commander, and in 1869 he was made a member of the Academy. He was a founder of the Société de Biologie and its president from 1867 to the time of his death in Paris. His obsequies were conducted at the public expense, an honor never before conferred on a scientific man.

BERNARD, bër'närd, SIR FRANCIS (1714-79) An English lawyer, a Colonial Governor of Massachusetts and New Jersey. He graduated at Oxford in 1736, distinguished himself at the bar, and in 1758 was appointed the Governor of New Jersey, whence, after two years, he was transferred to the Colony of Massachusetts Bay. During the early part of his administration he enjoyed the good will of the people, but on the division of the two parties he favored the crown, and by his harsh measures contributed greatly towards hastening the Revolutionary War. On the strength of his unfavorable representations regarding the designs of the colonists, troops were ordered to Boston, and the indignation aroused by this act was increased by his proroguing the General Court because that body refused to vote supplies for the soldiers. In 1769 he was recalled, and his departure was made an occasion of general public rejoicing. He took a special interest in Harvard College, and when its library was destroyed by fire in 1764 he raised funds for re-

placing it. He published *Letters to the Ministry* (1769), *Select Letters on the Trade and Government of America* (1774), etc., and his *Letter Books* are now in the library of Harvard University, as the bequest of Dr. Jared Sparks, who bought them in 1848.

BERNARD, JOHN HENRY, BISHOP OF OSSORY, FERNS, AND LEIGHLIN (1860-) An English clergyman and author. He was born in India and was educated at Trinity College, Dublin, becoming chaplain to the Lord Lieutenant of Ireland in 1886. He was made dean of St. Patrick's Cathedral, Dublin, in 1902, and Bishop of Ossory, Ferns, and Leighlin in 1911. He translated several of the philosophical works of Kant, and published *From Faith to Faith. University Sermons* (1895), *Tra Domini Cathedral Sermons* (1898), *The Irish Liberator Hymnorum* (1898), *The Second Epistle to the Corinthians* (1903), *The Odes of Solomon* (1912).

BERNARD, MONTAGUE (1820-82) An English lawyer, born at Tibberton Court, Gloucestershire, and educated at Trinity College. He was appointed to the newly established chair of international law and diplomacy at Oxford in 1859. He was one of the commissioners who came to the United States and signed the Treaty of Washington (1871) and in 1872 represented the British government at Geneva. In 1874 he resigned his professorship at Oxford, because of the pressure of his public employments, but he afterward was active in bringing about the compromise by which the interests of the college and the university were identified. He published *Four Lectures on Subjects Connected with Diplomacy* (1868), and *Historical Account of the Neutrality of Great Britain During the American Civil War* (1870).

BERNARD, SAINT, OF MENTHON (Menthon) (923-1007) The founder of the hospices upon the Great and Little Mount St. Bernard. He was born at Menthon, near Annecy, Savoy, was well educated, as his parents were titled people, early embraced a priestly life at Aosta and became archdeacon of the city. Later on he took up the monastic life and founded the hospices (962). He died at Novara, probably May 28, 1007. For his biography, consult L. Buigener (Lucerne, 2d ed., 1870).

BERNARD, BERNARD, SIMON (1779-1839) A French military engineer and for 14 years an officer in the United States corps of engineers. He served in the Army of the Rhine under Napoleon, who made him his aid-de-camp in 1813. In the retreat after the battle of Leipzig (1813) he was severely wounded, and in the same year was conspicuous for defending Torgau during a siege of three months. Having joined Napoleon on his return from Elba, he found it necessary after the 100 days to leave France. Upon the invitation of President Monroe in 1816 he came to the United States to become senior member of the Board of Engineers having charge of the construction of a new system of coast defenses. The most distinguished military engineer of his time, Bernard had a very important influence on the military works of the United States. Fort Monroe, constructed from his plans, is a splendid example of his work along the line of old French fortifications. His plans not only covered a system of Atlantic and Gulf coast defenses, but included as a part of the scheme for national protection an elaborate system of national roads, interior canals,

and waterways. He contributed particularly to the construction of such works as the Chesapeake and Ohio Canal, and the Delaware Breakwater. When the Revolution of 1830 in France broke out, he returned to that country, was restored to the French corps of engineers, and was made lieutenant general and aid-de-camp to King Louis Philippe. He also prepared plans for the fortification of Paris. In 1834 he became inspector general of engineers and from 1836 to 1839 he was Minister of War. Consult the biographical sketch by Gen. W. H. Carter, U.S.A., in *Journal of the Military Service Institution of the United States*, vol. 11 (1912).

BERNARDIN DE SAINT-PIERRE, bér-nar'dîn' de sîn pyër. See SAINT-PIERRE.

BERNARDINE, or BERNARDIN, OF SIENA, bér-nar-dên', sê-nâ, SAINT (1380-1444) An Italian Franciscan friar, born at Massa di Carrara. He entered the Franciscan Order in 1404, and was appointed vicar-general of the order in 1438. The strictness of the earlier monastic rule was restored by him. He was famous as a preacher and wrote several mystical works. He was canonized in 1450. His writings were published in Lyons in 1501 and in Venice in 1745. Consult Paul Thureau-Dangin, *Un prédicateur populaire dans l'Italie de la Renaissance. Saint Bernardin de Sienne* (Paris, 1896, English trans. by G. von Hugel, London, 1906).

BERNARDO DA VENEZIA, bér-nar'dô da vî-nâ'tsé-a (?-1436) An architect of the closing period of Italian Gothic. He was court architect to Gian Galeazzo Visconti, Duke of Milan, who founded the *Certosa* (q.v.) at Pavia. He was consulting architect of the cathedral of Milan and constructed the church of Santa Maria del Carmine, the finest Gothic church in Milan after the cathedral. Its superb façade is in five divisions, with rich details. He also erected the castle of Pavia. His Venetian origin explains a certain resemblance in the interior of the *Certosa* to Venetian churches.

BERNARDO DEL CARPIO, dêl kar'pê-ô. A Spanish warrior. He was the son of Don Sancho, Conde de Saldaña and Ximena, the sister of Alfonso II of Leon, who had been secretly married. On learning of the marriage the King imprisoned Don Sancho and had his eyes put out and sent his wife to a convent. The boy was brought up at court, gained early renown in the wars against the Moors, and became one of the most famous soldiers of the ninth century. Incensed because he could not obtain his father's liberty, Bernardo went over to the Moors and established himself in the strong castle of Carpio, whereupon the King promised to release the father if Bernardo would surrender the fortress. It is uncertain what became of Don Sancho, but, according to one version, the King put him to death, mounted him on a horse, and presented him thus to Bernardo. Another version has it that Don Sancho died before the King could fulfill his promise, but that in order to fulfill it as far as possible Alfonso mounted the corpse on a horse and presented it to Bernardo. According to some chronicles Bernardo went to France, where he became a wonderful knight-errant. His name occurs frequently in romances, ballads, and plays, and is the title of an epic poem of 1624. Lope de Vega makes him a national hero and conqueror of Roland at Roncesvalles. Mrs. Hemans has also made poetic use of him.

BERNARDO DELLA GIRANDOLE, dē'la jē'ran dō'la See BUNFALANTI, BERNARDO

BERNAUER, bē'nou-ēr, AGNES (c. 1435) A beautiful girl of Augsburg, whom Duke Albert of Bavaria loved and married (1432) His father, Duke Ernest, intent upon gaining for his son the hand of Anna of Brunswick, caused Agnes to be accused of witchcraft and drowned (1435) Albert in his grief and resentment made war upon his father, but was finally reconciled, erected a monument to the memory of Agnes, and married Anna of Brunswick The story of Agnes Bernauer has been made the theme of a number of poems, novels, and plays Consult Count Torring, *Agnes Bernauerin* (Stuttgart, 1891).

BERNAY, bē'r'nā'. The capital of an arrondissement of the same name in the department of Eure, France, on the Charentonne, 17 miles southeast of Lisieux (Map France, N, F 3). It has two fine churches, those of Sainte-Croix and Notre Dame, dating from the fourteenth century, and remains of an abbey of the eleventh century, now fitted up for public offices, and the abbey church as a market A noted horse fair, one of the most important in France, is held annually during the fifth week in Lent The leading industries are connected with the cotton and woolen cloth manufacture Pop, 1901, 6789, 1906, 8115, 1911, 7883

BERNAYS, bē'r'nās, AUGUSTUS CHARLES (1854-1907) An American surgeon He was born at Highland, Ill., and was educated at McKendree College, Lebanon, Ill., and at the University of Heidelberg After studying a year at the Royal College of Surgeons, England, he began to practice surgery in St Louis, Mo., where in 1883 he was appointed professor of anatomy and clinical surgery in the College of Physicians and Surgeons Afterward he was appointed to the same position at Marion Sims College and at Woman's Medical College During his life he ranked among the leading surgeons of the United States He was one of the earliest exponents of antiseptic surgery and performed successfully several important operations previously considered impossible These are treated in the work entitled *Kolpohysterectomy, a New Operation for the Treatment of Retroflexion of the Uterus, and The First Successful Case of Cesarean Section for Placenta Prævia*

BERNAYS, bē'r'nās, JAKOB (1824-81) A German philologist, of Jewish parentage He was born in Hamburg and was educated at the University of Bonn, where he was professor extraordinary and librarian from 1866 until his death He published *Die Lebensbeschreibung des J J Scaliger* (1855), *Die Dialoge des Aristoteles im Verhältniss zu seinem übrigen Werken* (1863), *Die Heraklitschen Briefe* (1869), *Zwei Abhandlungen über die Aristotelische Theorie des Dramas* (1880) His complete works, which deal chiefly with Greek philosophy, were edited by Usener (2 vols, Berlin, 1885) In classical philology his most important production is an edition of Lucretius (1856) Consult C Schaarschmidt, *Biographisches Jahrbuch* (Berlin, 1881)

BERNAYS, LEOPOLD JOHN (1820-82) An English divine, translator, and author He was born in London and was a son of Adolphus Bernays (1794-1864), professor of the German language and literature at King's College, London, from 1831 to 1863 He was educated at St John's College, Oxford, was head master of Els-

tree School from 1847 to 1860, and rector of Great Stanmore, Middlesex, from 1860 until his death With the exception of an ephemeral translation of *Faust*, comprising in all 50 copies, and published in London in 1838, Bernays's English translation of Part II of the famous German drama was the first to appear, being published in London in 1839, under the title *Faust a Tragedy, Part II, Translated from the German, Partly in the Metres of the Original and Partly in Prose, with Other Poems, Original and Translated* (1842)

BERNAYS, MICHAEL (1834-97) A German literary historian, brother of Jakob Bernays, born in Hamburg He studied at Bonn and Heidelberg and was professor of the history of literature at Munich from 1873 to 1890 His works treat chiefly Goethe and Shakespeare and include *Briefe Goethes an F A Wolf* (1868), *Zur Entstehungsgeschichte des Schlegelschen Shakespeare* (1872), *Goethe und Gottsched* (1880)

BERNBURG, bērn'bōrk A town in the German Duchy of Anhalt, till 1863 capital of Anhalt-Bernburg, situated on the Saale, 23 miles south of Magdeburg (Map German Empire, D 3) The town is divided into three sections—the Altstadt and the Neustadt, with the suburb of Waldau on the left bank of the river, the Bergstadt on the right, connected by a stone bridge Bernburg is well built, has several educational and charitable institutions, and manufactures of porcelain, paper, lead, zinc, cement, and starch It also has breweries, distilleries, mills, and iron foundries It is the centre of a fertile district and has considerable river traffic in grain and farm products Old Bernburg was a fortified town as early as the tenth century Pop, 1890, 28,328, 1900, 34,418, 1910, 33,703

BERNE-BELLECOUR, bērn' bēl'kōr, ETIENNE PROSPER (1838-1910) A French painter, born in Boulogne He was a pupil of Picot and Barrias and at first painted landscapes and portraits His reputation was, however, achieved with accurate and spirited pictures of episodes of the Franco-Prussian War His works, many of which are in private collections in the United States, include the following list "Cannon Shot," "Battle of Malmaison," depicting the artist and his comrades in arms, "Attack on the Château of Montbehard," and "To Arms!" The Metropolitan Museum of New York possesses his "Soldier in the Trenches" and "The Intended"

BERNER, bē'nēr, ALBERT FRIEDRICH (1818-1907) A German jurist and criminologist He was born at Strassburg, Brandenburg, and studied at the University of Berlin, where in 1848 he was appointed professor of law His best-known work is a *Lehrbuch des deutschen Strafrechts* (1857, 18th ed, 1895), which was translated into several foreign languages He also wrote a number of other works, including *Lehrbuch des deutschen Pressrechts* (1870) and *Judentum und Christentum und ihre Zukunft* (1891)

BERNERS, or **BARNES**, LADY JULIANA (b 1388?) Though little is known about Dame Juliana, she is said to have been the daughter of Sir James Berners, beheaded on Tower Hill in 1388, and to have become in the fifteenth century prioress of Sopwell nunnery, in Hertfordshire To her is attributed, on the authority of a colophon, one of the first books printed in England, *The Boke of Saint Albans*

(1486), comprising treatises on hawking, hunting, and heraldry. The book was printed at St Albans, but the name of the printer is unknown. In 1496 Wynkyn de Worde published a second edition, to which was added a treatise on fishing. In this continuation there is a quaint woodcut of a fisherman which has become celebrated. During the sixteenth century the book was extremely popular, as is evidenced by the numerous editions. Consult facsimile of first edition, with introduction by Blades (London, 1881), facsimile of the treatise on fishing, Watkins (London, 1880) and a version of the latter treatise from manuscript, made for the London Dialect Society, vol. xiv, Satchell (London, 1883).

BERNHARD, bérn'hart, COUNT OF ANHALT and DUKE OF SAXONY (1140-1212). The founder of the present ducal dynasty of Anhalt. He was the youngest son of Albert the Bear, the first Margrave of Brandenburg, who died in 1170. In addition to inheriting part of his father's dominions, out of which arose the little state of Anhalt, he came into possession of a portion of the Duchy of Saxony. When the country was partitioned by Henry the Lion, he also received a portion of the Dukedom of Saxony. His last political action was the forcible reinstatement of Archbishop Waldemar, at Bremen, in the face of the determined opposition of the Pope and of the Danish King.

BERNHARD, DUKE OF SAXE-MEININGEN (1649-1706). The founder of the present ducal dynasty of Saxe-Meiningen. He was a son of Duke Ernest the Pious, of Saxe-Gotha, and received his education at the University of Tübingen. After the death of his father (1675) he ruled in conjunction with his six brothers, until a settlement was effected whereby the Duchy of Meiningen was assigned to him as a separate possession, June 20, 1681.

BERNHARD, DUKE OF SAXE-WEIMAR (1604-39). A celebrated German general. He was born in Weimar, the youngest of the eleven sons of John III, Duke of Saxe-Weimar. On the outbreak of the Thirty Years' War he took the side of Protestantism against the Emperor and first distinguished himself in 1622 at Wimpfen. Subsequently he became colonel in the army of Christian IV of Denmark and took part in the bold expedition of Mansfield through Silesia to Hungary. He joined Gustavus Adolphus in 1630 and became one of the most famous leaders in the Thirty Years' War. He was conspicuous in the attack upon Wallenstein's position at Nuremberg in 1632 and won the indecisive victory at Lützen, having assumed the command after the death of Gustavus Adolphus. One of his most splendid achievements was the taking of Ratibon in 1633. In 1634 Bernhard and the Swedish general, Horn, suffered a terrible defeat at Nordlingen. When Richelieu took up the cause of the Protestants, Bernhard was enabled to maintain a large force by means of a French subsidy. In 1638 he opened the most brilliant campaign of his military career, the crowning success of which was the conquest of Breisach. He died suddenly at Neuenburg on the Rhine.

BERNHARDT, Fr. pron bérn'art', Ger. pron bérn'hart, ROSINE, called SARAH (1845-). A noted French actress, born in Paris of French and Dutch parentage. She is of Jewish descent, but at the age of 12, in accordance with her father's wish, was baptized into the

Christian faith and entered a convent to be educated. In 1858 she entered the Conservatoire, where she gained second prize for tragedy in 1861 and for comedy in 1862. At her debut at the Comédie Française in 1862, in a minor rôle in Racine's *Iphigénie*, she attracted little notice, and soon left the Comédie for the Porte Saint-Martin and the Gymnase, where she appeared in burlesque without success. In 1867 she joined the company at the Odéon and made her first notable success as Cordelia in a French version of *King Lear* and as the queen in Victor Hugo's *Ruy Blas*. She achieved a triumph there two years later by her remarkable creation of the rôle of Zanetto in François Coppee's *Le passant*. In 1872 she was recalled to the Comédie Française, where in 1874 she achieved brilliant successes as Berthe de Savigny in *Le sphinx* and as Phèdre in Racine's play of that name. The following year she was elected "sociétaire," and from this time on by a series of remarkable performances, chief among which was the rôle of Dona Sol in Victor Hugo's *Herminie* (1877), she steadily increased her reputation till she became the best-known actress of her time. In 1879 she appeared with notable success at the Gaiety Theatre in London. Returning to Paris, she began an engagement in Emile Augier's *L'aventurière*, but, owing to unpleasant relations with other "sociétaires" and unfavorable criticism of her acting, she abruptly severed her connection with the Comédie and left after the first performance. For this breach of contract she was condemned to pay a forfeit of 100,000 francs. After leaving the Comédie Française she returned to London, where she gave a series of performances, appearing with great success in *Adrienne Lecouvreur* and *Frou-frou*. During 1880 and 1881 she made tours in Denmark, Russia, and America, relying chiefly on *Adrienne Lecouvreur*, *Frou-frou*, and *La dame aux camélias* for her repertoire. In 1882 she returned to London and married Jacques Damala, a Greek actor, from whom she separated the following year. On her return to Paris she achieved another signal triumph in the *Fédora* of Sardou, and thus began her long connection with this popular author. He wrote for her *Théodora* (1884), *La Tosca* (1887), and (in collaboration with Moreau) *Oléopâtre* (1890). She appeared in these, and in Jean Richepin's *Nana Sahib* (1883), Jules Barbier's *Jeanne d'Arc* (1890), and many other plays produced at the Porte Saint-Martin, of which she was proprietress from 1883 to 1893. During this decade she made visits to America in 1886-87 and 1888-89, and between 1891 and 1893 she made a tour of the world, including North and South America, Australia, and the chief European countries. In 1893 she opened the Théâtre de la Renaissance in Paris, where she appeared in *Les rois et Sylvestre* (1893), *Izyl* and Sardou's *Gismonde* (1894), Rostand's *La princesse lointaine* and a French translation of Sudermann's *Itimat* (1895), an adaptation of Alfred de Musset's *Lorenzaccio* (1896), and Rostand's religious drama *La Samaritaine* (1897). In 1896, during an elaborate public fête held in her honor, she received congratulations from almost every country in the civilized world. She left the Théâtre de la Renaissance in 1899 and moved to a larger house, the Théâtre des Nations, which she renamed the Théâtre Sarah-Bernhardt, and opened with a revival of *La Tosca*. Here also she appeared as the weak-

willed son of Napoleon I in Rostand's *L'Aiglon*. Her success in this led her to attempt a French production of *Hamlet*, in which she played the title rôle. She repeated both these performances in London the following year (1901). In 1900 she appeared in America in *L'Aiglon* with Constant Coquelin, for whom the play was originally designed. She visited America again in 1911, appearing in a repertoire of her best-known rôles, and in the spring of 1913 returned and played a short engagement, her repertoire consisting of single acts selected from *Phedre*, *Lucio Bojia*, *La dame aux camélias*, *La Tosca*, and a new one-act play entitled *Une nuit de Noël, sous la tenture*, written by her son Maurice Bernhardt in collaboration with Henri Cain. Owing to a slight accident, she was unable to walk without assistance during this engagement, but her matchless voice was unimpaired, and she received an ovation at every performance. Her position as the first actress of her day is undisputed. She has never been able, as Modjeska was, to portray the highest inspirations of poetry, and she lacks Duse's serenity and sincerity and her ability to suggest unutterable emotions, but she is mistress of every item of stagecraft, and where inspiration fails her she triumphs by sheer technical efficiency. With the exception of Coquelin no actor or actress of her time has approached her in the perfection of her art. Before age destroyed her panther-like grace, her every pose and movement were so artfully contrived that they appeared inseparable from the character she was portraying. In addition to her extraordinary gifts as an actress, she has shown considerable talent in sculpture, painting, and writing. She has exhibited both painting and sculpture at the Salon, where her piece entitled *Après la tempête* (1876) received honorable mention. In 1878 she published a prose sketch, *Dans les nuages, les impressions d'une chaise*, and in 1907, a volume of *Mémoires*. She has written two plays, a one-act comedy *L'aveu*, produced at the Odéon in 1888, and a longer piece entitled *Adrienne Lecouvreur* (1907), based on the play of that name by Scribe and Legouvé. She was made a member of the Legion of Honor in 1914, and in the same year, in Paris, won one of her greatest triumphs in Tristan, Bernard's *Jeanne Doré*. Consult Jules Huret, *Sarah Bernhardt* with a preface by Edmond Rostand (Eng. trans., Philadelphia, 1909), and her own *Mémoires* (Paris, 1907).

BERNHARD VON NORDALBINGEN, bérn'hart fön nót'al'bl'ng-en. See BASEDOW, JOHANN BERNHARD.

BERNHARDY, bérn'har-dé, GOTTFRIED (1800-75). A German classical scholar, born at Landsberg, Brandenburg. He held a professorship at the University of Berlin from 1825 until 1829. He was professor in the University of Halle and director of the Philological Seminary from 1829 until his death. Among his chief publications are *Wissenschaftliche Syntax der griechischen Sprache*, first published in 1829, but enlarged by supplements in 1854 and 1862; *Grundriss der römischen Literatur* (1830, 5th ed., 1872); *Grundriss der griechischen Literatur* (2 vols., 1836-45), and a great edition of Suidas (4 vols., 1834-53). Consult R. Volkmann, *Gottfried Bernhardt* (Halle, 1887).

BERNI, bér'né, FRANCESCO (1497 or 1498-1535). An Italian humorist and satiric poet.

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He was born at Lamporecchio and was successively in the service of his relative, Cardinal Bibbiena, of Ghisberti, Bishop of Verona, and of the Cardinal Ippolito de' Medici, who in 1533 appointed him a canon at Florence. He died in 1533, poisoned, according to the one story, by the Cardinal Innocenzo Cibo, because he would not lend himself to a plot to kill a certain Cardinal Salviati. Berni is one of the greatest Italian humorists. His *Rime* pass in review all the intimacies of Italian popular life and manners, with a keen sense of the comic, which he expresses at times with depth, always with brilliancy and elegance. He enlarged immensely the field previously traversed in satire by Antonio Pucci and Burchiello, bringing also into his work serious artistic effort and great originality in form. His favorite comic device was to treat trivial subjects in majestic style, as, for instance, in his erudite commentary on a poem describing a game of cards. His most famous satire, *Al Fracastoro*, describes an uncomfortable night passed at a friend's house. Berni has given his name to the *poesia bernesca*, the rollicking bulesque manner, where Grazzini (Lasca) is his most celebrated imitator. Berni's remodeling of Boiardo's *Orlando innamorato*, which he regarded as his chief title to fame, is now considered an aesthetic blunder, though it has qualities in the humorous parts which brought out Berni's real genius. The edition of the *Riformamento* of Florence (1827-28), contains a biography by Corniani. The *Rime poesie latine e lettere*, were last edited by Virgili (Florence, 1885). Consult G. Mazzoni, *Vita libri e carte* (Roma, 1887), and P. Micheli, *Saggi critici* (Città di Castello, 1906). Parts of Berni's version of the *Orlando innamorato* were translated by R. Alsop (New York, 1806).

BERNICE, bér-ni'sé. See BERENICE.

BERNIER, bér'nyá', FRANÇOIS (c.1620-88). A French physician and traveler, born at Angers. He took his degree of doctor at Montpellier, departed for the East about 1654, and visited Syria, Egypt, Arabia, and India, in the last of which countries he resided for 12 years in the capacity of physician to the Great Mogul. On his return to France he published an account of his travels in India, *Les voyages de Bernier contenant la description des Etats du Grand Mogul, de l'Hindoustan* (1699). This work is delightful in style and accurate in the delineation of manners and customs as well as in the description of places.

BERNINA, bér-né'na. A mountain of the Rhetian Alps in the southeastern part of the Swiss Canton of Grisons (Map Switzerland, D 2). It attains an altitude of 13,300 feet in its highest peak and is covered with numerous glaciers, among which the Morteratsch and Roseg are the largest. The Bernina Pass, situated at an elevation of about 7700 feet, over which a carriage road has been constructed from Samaden to Tirano, unites the valley of the upper Engadine on the north with the Valtellina on the south and is much frequented during seasons of good grade harvest.

BERNINI, bér-né'né, GIOVANNI LORENZO (1598-1680). The most celebrated Italian sculptor of the Baroque period, also renowned as an architect. The son of a Tuscan sculptor employed at Naples, he was born in that city Dec 7, 1598. Under his father's careful training he carved creditably at the age of eight. After

their removal to Rome the boy's remarkable endowments procured him, in his tenth year, an audience with Paul V, who prophesied that he would be the Michelangelo of his century. The boy studied for three years with tireless energy among the antiques of the Vatican and in his teens executed groups which placed him in the foremost rank of his day. In the best known of these, the "David," his own portrait, "Apollo and Daphne" (both in the Villa Borghese), and the "Rape of Proserpine" (Villa Ludovisi), all the characteristics of his fully developed style appear. He was made a Knight of the Order of Christ by Gregory XV, and, with the accession of his friend and preceptor, Urban VIII, Barberini, became the practical dictator of all artistic undertakings. After two years' study in painting and architecture, required by the Pope for the great project, he designed and erected the colossal baldacchino with its twisted columns under the cupola of St Peter's. The bronze for this vast structure was secured by the flagrant destruction of the ancient casseted ceiling of the portico of the Pantheon. On the death of Maderna in 1629, he became architect of St Peter's and completed the Barberini Palace, himself designing the grandiose façade and elliptical staircase. His most attractive statue of this period is "Santa Bibbiana" in St Peter's. Two years before Urban VIII's death he began his celebrated tomb in St Peter's, with the highly characteristic bronze statue of the Pope. His chief works under Innocent X were the "St Theresa" group in Santa Maria della Vittoria, and the celebrated fountain of the Piazza Navona. The Fontana Trevi was also executed later after his design. Under Alexander VII (1655-67), he designed the colonnade of St Peter's and the Scala Regia connecting the church with the Vatican—works of the highest architectural order. Of less artistic importance is the celebrated "Cattedra di San Pietro" in the apse of the church, designed to support the traditional chair of the first Roman bishop. On a journey to Paris, where he furnished a design of construction for the Louvre to Louis XIV, he was received like a royal personage. After his return to Rome, he conducted the restoration of the Bridge of Sant' Angelo, designing and in part carving the 10 colossal angels upon it. After having for 50 years dictated the artistic taste and achievements of the papacy, during which time he designed or executed 37 busts, 58 statues, and 50 architectural works, he died in Rome, Nov 28, 1680. Never during his lifetime has an artist received greater honor and appreciation. His conceptions dominated the sculpture of Europe for over 100 years. To modern taste they are far less pleasing, for, while his work displays great technical ability and fine decorative quality, it is exaggerated in form and theatrical in action. His portrait busts, however, are unequalled in realistic power and characterization. His biography was written by a relative, Domenico Bernini (Rome, 1713); consult also Dohme, *Kunst und Künstler* (Leipzig, 1879); De Chantelou, *Journal du voyage de chevalier Bernini en France* (ed Lalanne, Paris, 1885); Fiaschetti, *Il Bernini* (Milan, 1899).

BERNIS, bĕr'nĕs', FRANOIS JOACHIM DE PIERRES DE (1715-94). A French prelate and diplomatist, born at Saint Marcel, Ardèche. He was educated for the priesthood, but turned first to diplomacy and became Ambassador to Venice

in 1751. He represented France in the negotiations preceding the Seven Years' War and became Foreign Secretary. In 1758 he was made a Cardinal, but offended the King and was banished from court. In 1764 he recovered the royal favor and was made Archbishop of Albi. On the election of Clement XIV he became Ambassador to Rome and carried out the wishes of Choiseul, his successor as Foreign Secretary, in urging the suppression of the Jesuits. He lost his dignities at the Revolution, refusing to take the oath of allegiance to a constitution "of which an essential feature was the destruction of the ancient discipline of the Church," and died a pensioner of Spain. Consult his *Mémoires et lettres* (Paris, 1878, ed Frederic Masson. Eng trans, New York, 1902), also his *Correspondence avec Voltaire* (Paris, 1799). Consult Leon Cahen, "Le mémoires du Cardinal de Bernis," in *Revue d'histoire moderne et contemporaine*, vol. xii (1909).

BERNOULLI, bĕr'nō'yĕ, or **BERNOULLI**. The name of a family famous for the successful cultivation and extension of mathematical and physical science. Its original habitat was Antwerp, but the attachment of the founder of the family (Jakob) to the Reformed religion forced him to seek an asylum in Frankfurt-on-the-Main. Later on the family established itself at Basel, where several of the family acquired great distinction. The relationship between the most important members of the family was as follows: Nicolas Bernoulli (1623-1708) had 11 children, including Jakob (1654-1705), Nicolas, and Johann (1667-1748). Famous among their descendants are a son of Nicolas, likewise named Nicolas (1687-1759), and three sons of Johann, named Nicolas (1695-1726), Daniel (1700-82), and Johann (1710-90). Two sons of the last named are celebrated: Johann (1744-1807) and Jakob (1758-89). See the following articles.

BERNOULLI, DANIEL (1700-82). He was born at Groningen and was the second son of Johann (Jean) Bernoulli. After having studied mathematics with his father, he studied medicine. He occupied successively a chair of mathematics at St Petersburg (1725-32), a chair of anatomy and physics at Groningen, and chairs of anatomy, botany, and physics at Basel. He was a member of several academies and took numerous prizes in Paris. Daniel Bernoulli was extremely versatile. His principal work is the *Hydrodynamica*, in which he first developed the kinetic theory of gases.

BERNOULLI, JAKOB, JACQUES, or JAMES (1654-1705). A celebrated mathematician. He was born at Basel. Destined by his father for a chair of theology, he early showed his preference for science, and, after visiting France, Holland, and England, he was made professor of mathematics in the University of Basel (1687). He and his younger brother, Johann (q.v.), were among the first to understand and use the new method of Leibnitz. He solved the latter's problem (1687) of the isochronous curve, proposed and solved the problem of the catenary, solved that of the brachistochrone proposed by Johann, contributed to the theory of isoperimetry, and, in general, was one of a famous group of problem solvers, including his brother, Leibnitz, l'Hôpital, and Huygens. The result of the disputes over these problems was a serious estrangement between his brother and himself. He was a voluminous writer, his principal works including *Conamen Novi Systematis Cometarum*

(Amsterdam, 1682), suggested by the appearance of the comet of 1680, *Dissertatio de Gravitate Aethæris* (Amsterdam, 1683), and his contributions to the *Acta Eruditorum*, in one of which (May, 1690) the word "integral," as applied to a differential equation, is used for the first time, although Leibnitz had already used the symbol \int . The best known of his works, *Arts Conjectandæ* (1713), published posthumously (by Nicolas Bernoulli), extended the doctrine of probabilities to moral, political, and economical subjects.

In connection with the effort to prove that the number of times an event can happen in n trials lies between definite limits, Bernoulli proved the celebrated proposition, according to which "it is always possible to increase the number of trials till it becomes a certainty that the proportion of occurrences of the event will differ from p , its probability on a single trial, by a quantity less than any assignable."

His works were published under the title *Jacobi Bernoulli Basileensis Opera* (2 vols, Geneva, 1744). At his request, recalling the example of Archimedes (qv), a logarithmic spiral was engraved on his tomb, with the motto *Eadem Mutata Resurgo*, and this is still to be seen in the cloisters of the cathedral at Basel. Consult Saalschutz, *Vorlesungen über die Bernoullischen Zahlen* (Berlin, 1893) and Cantor, *Geschichte der Mathematik* (2d ed, Leipzig, 1898).

BERNOULLI, JAKOB, or **JACQUES** (1758-80). He was born at Basel. At the age of 21 he undertook the duties of the chair of experimental physics at Basel, his uncle Daniel having resigned the post on account of old age. A little later he became professor of mathematics at St. Petersburg and married a granddaughter of the great mathematician Euler. He was shortly after drowned in the Neva. Several of his memoirs were published in the *Nova Acta Academiae Petropolitanae*.

BERNOULLI, JOHANN, or **JEAN** (1667-1748). He was born at Basel. He and his brother Jakob were the first two foreigners honored by an election to the academies of Paris and Berlin. At the age of 23 he was appointed professor of mathematics at Groningen and on the death of his brother, 10 years later, succeeded him in a similar chair at Basel. As a teacher of mathematics he had no superior in his day. Among his pupils was Euler, whom he encouraged in his first efforts, and among his friends was Leibnitz, whose cause he always championed. Unfortunately he had a very jealous disposition, which showed itself not only in his relations with his brother, but even with his own son (Daniel). His *Opera Omnia*, in 4 vols, quarto, were published at Geneva in 1742, and his correspondence with Leibnitz, in 2 vols, at Lausanne in 1745. He proposed the problem of the brachistochrone and that of the minimum line between two points on a given surface, founded, jointly with his brother Jakob, the theory of isoperimeters, and was one of the pioneers in the work of constructing an exponential and an integral calculus, and to recognize completely the legitimacy of the real results from calculations involving the imaginary.

BERNOULLI, JOHANN, or **JEAN** (1710-90). He was born at Basel and was a brother of Daniel and the third son of Nicolas Bernoulli. He occupied successively the chairs of eloquence

and mathematics at Basel. The Academy of Sciences of Paris honored him three times for his contributions to the theory of heat and light. He was also a member of the Berlin Academy. His two sons, Johann and Jakob, were likewise famous men of science.

BERNOULLI, JOHANN, or **JEAN** (1744-1807). He was born at Basel. He received the degree of doctor of philosophy at the age of 13 and was made astronomer to the Academy of Berlin at the age of 19. His later works did not fulfill his youthful promise. His principal contributions were *Recueil pour les astronomes* (3 vols, Berlin, 1772-76, with a supplement in 1779), and *Lettres astronomiques* (1781).

BERNOULLI, NICLAUS, or **NICOLAS** (1695-1796). He was born at Basel and, like several other members of his family, was a youthful prodigy. At the age of 8 he could speak German, Dutch, French, and Latin, at 16 he took the degree of doctor of philosophy at Basel, and at 20 he received the degree of doctor of laws. He was professor of jurisprudence at Bern, and professor of mathematics at St. Petersburg, where he died. He wrote a history of the problem of trajectories. His important papers were published in an edition of his father's works in 1742.

BERNOULLI, NICOLAS (1687-1759). He was born at Basel. He was a friend of Newton and Halley, whom he visited in England, was a corresponding member of the principal academies of Europe, and professor of mathematics at Padua, and of law and logic at Basel. He edited the *Arts Conjectandæ* of his uncle Jakob. His own contributions relate chiefly to differential equations.

BERNSTEIN, BERNSTEIN, AARON (1812-84). A German publicist and author. He was born at Danzig, of Jewish parentage, and studied in Berlin. His admirable translation of the *Song of Songs* (published under the pseudonym of A. Rebenstein, 1834) and his publication of the work entitled *Das junge Deutschland* established his fame as a writer among the literary circles of Berlin. In 1849 he founded the *Urwählerzeitung*, in which (in 1851) he published some ultra-democratic articles which brought about his imprisonment. The paper was finally suppressed in 1853, when Bernstein established the *Volkszeitung*, a journal devoted, like its predecessor, largely to the dissemination of democratic views. His numerous and varied publications include *Revolutions- und Reaktionsgeschichte Preussens und Deutschlands von den Marztagen bis zur neuesten Zeit* (3 vols, 1883-84), and *Aus dem Reiche der Naturwissenschaft* (1856), later republished under the title *Naturwissenschaftliche Volksbücher* (1880, and frequently reprinted), a valuable work, which has been translated into nearly all the languages of Europe.

BERNSTEIN, EDUARD (1850-) A German social-democratic leader, born in Berlin. From 1881 to 1890 he was editor of the *Sozialdemokrat*. His socialistic views made it desirable for him to withdraw to London in 1888, after the publication of his criticism of Marxist doctrines he was permitted to return to Germany, where in 1902 he became editor of the *Dokumente des Sozialismus*. He also became editor of a weekly paper, *Welt am Montag*. Bernstein is one of the ablest critics of the doctrines of Karl Marx. He rejects the materialistic conception of history as inadequate

to explain modern social evolution, he regards the Marxian labor theory of value as untenable, and through careful statistical studies he endeavors to show that the prediction of Marx regarding the extinction of the middle class through concentration of wealth in fewer and fewer hands has been disproven by the course of events. The conquest of political society by the proletariat through mere increase in mass he regards as an illusion, he therefore urges all the democratic elements in society to work together for the democratization of the German state and the securing of social reforms. He was elected to the Reichstag in 1902, failed at the elections of 1907, but was again returned in 1912. His published works, besides an edition (1891-93) of the speeches and writings of Lasalle (translated into English, 1893, by E. Aveling), include *Die Voraussetzungen des Sozialismus und die Aufgaben der Sozialdemokratie* (1899, 1909), Eng. trans. by E. C. Harvey (1909), *Zur Geschichte und Theorie des Sozialismus* (1900, 1904), *Die heutige Sozialdemokratie in Theorie und Praxis* (1905), *Parlamentarismus und Sozialdemokratie* (1906), *Die Geschichte der Berliner Arbeiterbewegung* (1907-10).

BERNSTEIN, GEORG HEINRICH (1787-1860) A German Orientalist. He was born Jan. 12, 1787, at Cospeda, near Jena. He studied at the universities of Jena, Leipzig, and Göttingen, and in 1812 became assistant professor of Oriental literature at the University of Berlin and in 1821 full professor at Breslau. He made many journeys to the great libraries of Europe, visiting Oxford, London, Cambridge, Florence, Rome, Naples, and Venice, and gathering scientific material drawn chiefly from manuscript sources. His greatest philological activity was displayed in the publication of Syriac texts, the most noteworthy being the *Chronicle of Bar-Hebraeus* (1822) and portions of the same author's *Horæum Mysterium* (1858). In the domain of Arabic literature he is known for his edition of the *Poem of Saïf ad-dîn* (1816). He also published a new and entirely revised edition of Kirsch's *Chrestomathia Syriaca* (1832-36). It was his intention to publish an elaborate Syriac dictionary, of which, however, only the first part appeared (1857). He died at Lauban on April 5, 1860.

BERNSTEIN, HENRY LEON GUSTAVE CHARLES (1876-) A French dramatist, born in Paris of Jewish parents. His first play, *Le marche*, was produced at the Theatre Antoine in 1900. *La détour* and *Joujou* appeared in 1902, *Frère Jacques*, written in collaboration with P. Vabre, in 1903, *Le bœuf*, in 1904, *La griffe*, in 1905, *La rafale* and *Le voleur*, in 1906. *Samson, Israël, après moi*, and *L'assaut* followed at intervals of a year each between 1907 and 1911. English versions of *Le voleur*, *Samson, Israël*, and *L'assaut* have been produced in America and England, and *Le secret* was presented in New York, 1913-14. Bernstein's work is characterized by technical skill in plot construction, vigor and boldness in execution, and intense and violent emotion.

BERNSTEIN, JULIUS (1839-) A German physiologist, born in Berlin. He became professor of physiology at Heidelberg in 1869, at Berlin in 1871, and at Halle, 1872 to 1911. The character of his researches is expressed in the titles of such works by him as *Untersuchungen über den Erregungsvorgang im*

Nerven- und Muskel-system (1871), *Die fünf Sinne des Menschen* (2d ed., 1899), *Elektrobiologie, die Lehre von den elektrischen Vorgängen imorganismus auf moderner Grundlage* (1912). He wrote also several texts including *Lehrbuch der Physiologie* (3d ed., 1910).

BERNSTORFF, BERNSTOIF, ALBRECHT, COUNT (1809-1873) A Prussian diplomatist and statesman, born at Drelutzwitz (Mecklenburg-Schwerin). He was Secretary of Legation at St. Petersburg and Paris, and in 1840 was sent as envoy to Naples. He was appointed Ambassador at Munich in 1845, at Vienna in 1848, at Naples in 1852, and at London in 1854. As Minister of Foreign Affairs in 1861-62, he concluded commercial treaties with China and Japan. He was Ambassador at London, successively of Prussia, the North German Confederation (1867), and the German Empire (1871).

BERNSTORFF, ANDREAS PETER, COUNT (1735-97) A Danish statesman, Minister of Foreign Affairs in Denmark from 1772 to 1780 and from 1784 to 1797. He was born in Hanover and was the nephew of Johann Bernstorff. He was instrumental in securing the emancipation of the Danish peasantry begun by his uncle, took an active part in concluding the negotiations for the "armed neutrality" (qv) and arranged for the abolition of serfdom in Schleswig-Holstein. He was a steadfast champion of liberal principles and energetically opposed every restriction of the press. Consult A. Fins, *Andreas Peter Bernstorff og Ole Boegh Guld, 1772-1780* (Copenhagen, 1899) and id., *Andreas Peter Bernstorff und die Herzogtümer Schleswig und Holstein, 1773-1780* (Kiel, 1900).

BERNSTORFF, JOHANN HARTWIG ERNST, COUNT (1712-72) A Danish statesman, born in Hanover. He represented Holstein at the Diet of Regensburg in 1838, and became Minister of Foreign Affairs in 1751. To his policy was due the neutrality of Denmark during the Seven Years' War, and he contributed in every way to the prosperity of the country, promoting commerce, industries, art, and science. He emancipated the peasants on his estates. Frederick the Great styled him the "Oracle of Denmark." Consult Ahleman, *Ueber das Leben und Charakter des Grafen Bernstorff* (Hamburg, 1777) and P. Bedel, *Den ældre Greve Bernstorffs Ministerium* (Copenhagen, 1882).

BERNSTORFF, JOHANN HEINRICH, COUNT (1862-) A German diplomat, born in London, a son of Count Albrecht Bernstorff. He was educated at the gymnasium of Dresden, and at Ratzburg. From 1881 to 1889 he was an officer of the First Regiment Artillery Guards at Berlin, but after that was known entirely in a diplomatic connection—in earlier years (1880-92) as attaché of the German embassy at Constantinople and in the foreign office at Berlin, later (1892-1902) as Secretary of the Belgrade, Dresden, and Munich legations and of the St. Petersburg embassy, still more recently as counselor of the embassy at London (1902-06) and Minister at Cairo (1906-08), and, after 1908, as Ambassador of Germany to the United States. The degree of LL.D. was conferred upon him by a number of American universities.

BERNWARD, BERNVART (?-1022) A German ecclesiastic, Bishop of Hildesheim from 993 to 1022. He was at first court chaplain of Emperor Otto III. He greatly promoted the

welfare of his bishopric. He founded the cloister of St Michael and began the erection of St Michael's Church. He surrounded Hildesheim with walls and developed art and industry. He was canonized in 1193. Consult the biography by Thankmar, in *Monumenta Germaniae Historica*, vol. v (Berlin, 1893), and Sommerwerck, *Der heilige Bernward* (Hildesheim, 1885).

BEROALDO, bē'rō-āl'dō, FILIPO (1453-1503). An Italian scholar, born at Bologna. He gave lectures at Parma, Milan, and Paris, and was afterward professor of ancient literature at the University of Bologna. He published valuable annotated editions of Plautus, the Elder Pliny (the first commentary on Pliny), Lucan, Suetonius, Aulus Gellius, Propertius, and other Latin authors, thus contributing much to the literary renaissance. Consult Buckhardt, *Die Kultur der Renaissance in Italien* (Leipzig, 1899).

BEREA, or **BERE'A** (Gk Βέροια, *Beroia*). 1. A place in Palestine, possibly to be identified with Beeroth (Josh ix 17) or Beioth (1 Es v 19), the modern *Bireh*, some 10 miles north of Jerusalem, where Judas Maccabeus fought his last battle and lost his life 161 B.C. (1 Mac ix 4, 18). 2. A city in northern Syria, the modern Aleppo, where Menelaus, the ex-high priest, was put to death by Antiochus Eupator (2 Mac xiii 4). 3. A city of Macedonia, in Greece, founded by Theron (Beron) or by Berea, daughter of Beros, the modern *Verria*. It is mentioned in Acts xvii 10-15 as visited by Paul after he left Thessalonica. Here the Apostle, with Silas and Timothy, founded a Christian community. It was the most populous city of Macedonia in the first century of the Christian Era. In the ninth century it was destroyed by an earthquake.

BEROSUS (Gk Βήροδος, *Bērosos*, probably the Assyrian *Bērosu*). An historian and priest of Belus at Babylon. He was a native of Bithynia and so acquainted with Greek. He wrote, about 280 B.C., three books on Babylonian history (Βαβυλωνικά), dedicated to King Antiochus I Soter, in which he made use of the temple chronicles at Babylon. This work interested especially the Jews and later the Christians for its close agreement with the early Jewish records. It has come down to us only in fragments preserved by Josephus, Eusebius, Syncellus, and others, who, however, drew upon Berossus not directly, but through Alexander Polyhistor and Apollodorus. Besides this history, he wrote a special work on Chaldean astrology (Χαλδαϊκά). Fragments were edited by Richter (1825), Muller, *Fragmenta Historicorum Graecorum* (Paris, 1848). The work, *Antiquitatum Libris Quinque cum Commentariis Ioannis Anni*, first published (Rome, 1498) in Latin as a work of Berossus, was actually written by the Dominican Giovanni Nanni, of Viterbo.

BERQUIN, bēr'kīn', ARNAUD (c.1749-91). A French author, born at Langorain. He won his first success with his *L'ami des enfants* (6 vols., 1782-83), which was crowned by the French Academy (1784), and supplied him with a popular surname. He was an editor of the *Monteur* and a contributor to the *Feuille villageoise*. His *Oeuvres complètes* appeared in Paris (20 vols., 1803).

BERRUQUIN, LOUIS DE (1489-1529). A French Huguenot, born at Passy. He studied law and was appointed a counselor of Francis I. He was a friend of Erasmus and, having been conspic-

uous in his defense of the new doctrine, was imprisoned and called upon to retract. Rescued by the intervention of the King, he retired to Amiens, but was again imprisoned, and was burned alive in Paris. He was the first French Protestant martyr. He published *Enchiridion viar du chevalier chrétien* (1529) and other works.

BERRÉDO E CASTRO, bē'rē-dō ē kās'trō, BERNARDO PEREIRA DE (c.1680-1748). A Portuguese historian, born at Seipa. He entered the army and fought at the battle of Saragossa (1710), where his bravery gave him the appointment of Governor-General of the Province of Maranhão, Brazil. In 1718 he became captain general of Mazagão. The history to which Berrédo devoted the rest of his life has acquired great value by reason of the destruction of many of the documents in the Portuguese archives, upon which it was based. It is entitled *Annaes historicos, do estado do Maranhão, em que se da noticia do seu descobrimento e tudo o mais que n'elle tem succedido desde o anno em que foi descoberto até o de 1718* (1749).

BERRIEN, bēr'ri-ēn, JOHN MACPHERSON (1781-1856). An American lawyer and politician. He was born in New Jersey, and graduated at Princeton in 1796. He was judge of the eastern district of Georgia from 1810 to 1821, was a United States Senator from 1825 to 1829 and again from 1840 to 1852, and was Attorney-General in Jackson's first cabinet from 1829 until 1831, when he resigned.

BERRUGUETE, bēr'rōō-gē'tā, ALFONSO (c.1483-1561). A Spanish sculptor, painter, and architect, one of the most important of the Renaissance. He was born at Paredes de Nava in Old Castile, and was a pupil of his father, Pedro Berruguete, a distinguished painter. In 1504 he proceeded to Florence, where he became a pupil of Michelangelo, he remained in Italy until 1520. On his return to Spain he became the pioneer of the High Renaissance in his native country. At Valladolid he won the favor of the Emperor Charles V, who in 1523 bestowed upon him a judicial sinecure (which the painter sold many years afterward for 5000 gold ducats) and who named him court sculptor, painter, and court chamberlain. Among his works were the high altar of San Benito, the sculptured remains of which are still in the Museum of Valladolid, the retablo of the Colegio Mayor de Santiago in Salamanca (1529-31), with eight large pictures from the life of Christ, the alabaster altar of the Holy Trinity in the cathedral of Jaca (1538), and his most celebrated work, the 35 choir stalls which, together with the bishop's throne, he executed for the cathedral of Toledo. The backs of these stalls are adorned with wooden reliefs illustrative of the Old and New Testaments, and above the cornice are alabaster figures of the patriarchs, prophets, and saints. At Toledo, where Berruguete resided, is also the retablo of the church of Carceres. Mention should also be made of his sepulchral monuments, the finest of which are the mausoleum of the Marqueses de Poza in the Dominican church at Palencia (1553-57), and the tomb of Cardinal Tavera in the hospital of San Juan de Afuera in Toledo, his last and one of his best works.

Berruguete was considered by his contemporaries the greatest artist of Spain, and many important works of painting, sculpture, and architecture have been incorrectly ascribed to

him. He is most important as a sculptor, in which art he is one of the foremost representatives of the Renaissance in Spain, although his art is often exaggerated in form and in movement. The only authentic examples of his paintings, which are at Salamanca and Valladolid, are mannered and show a bizarre though clever reproduction of Raphael's forms. His activity as an architect was confined to purely decorative features, such as retables, portals, etc. The important buildings formerly ascribed to him, such as the Town Hall of Seville and the royal palace at Granada, are now known to be the work of other men. The best account of Berrugete was written by Karl Justi in various numbers of the *Jahrbuch der königlich preussischen Kunstsammlungen*.

BERRY, or **BERRI** (anciently, Lat *Biturica*, inhabited by the *Bituriges*, a Gallic tribe). One of the old French provinces, now forming the departments of Indre and Cher. In ancient times it formed part of the Roman province of Aquitania, and passed under the domination of the Franks in the sixth century. Later it enjoyed its independence under a line of hereditary counts. In 1360 it was made a duchy and in 1601 annexed by the French crown. It gave title at various times to French princes, the younger son of Charles X being the last to hold it. George Sand in her *Légendes Rustiques* and other novels of her later life gives very good pictures of the country and life of the present day Berry.

BERRY (AS *berie*, *berige*, Ger *Beere*, Goth **basi* in *Weinbas*, grape, literally, 'wine-berry', probably originally 'edible fruit,' cf. Skr *bhas*, to chew). A fleshy fruit which is pulpy throughout and has a thin skin, such as the grape, currant, tomato, etc. See **FRUIT**.

BERRY, *Fr* pron. bɛʁʁi, CHARLES FERNAND, Duc DE (1778-1820). The second son of Charles X of France. He was born in Versailles, Jan. 24, 1778. An émigré of the Revolution, he served under Condé until the armistice of Leoben, when he entered the Russian service. After his discharge he visited England and married a Miss Brown, whom he soon abandoned on the ground that Louis XVIII disapproved of the marriage. In 1815 he was appointed to an important post by the King, and in 1816 he married Marie Caroline Ferdinande Louise, Duchess of Naples. One daughter, Louise Marie Thérèse d'Artois, was born of this marriage in 1819, and a posthumous son, Henri, on Sept. 29, 1820. Berry was assassinated in February, 1820, by one Louvel.

HENRI, at first styled Duc de Bordeaux and later Comte de Chambord (qv), was heir to the French throne after the death of Charles X, but though called Henri V by his partisans, he was excluded from the throne by the July Revolution of 1830. His mother, a woman of great ambition and courage, entered into a project for reinstating the Bourbons, but she was arrested after landing in France in 1832 and was imprisoned in the citadel of Blaye. Her confession that she had formed a second marriage with the Neapolitan Marquis Lucchesi-Palli destroyed her political importance, and she was set at liberty. She died in 1870. Henri died without heirs in 1883. Consult Chateaubriand, *Mémoires sur le duc de Berry* (Paris, 1820), which is royalist and eulogistic in tone, and Chateaubriand, *Complete Works*, vol. III (Paris, 1834).

BERRY, **HIRAM GEORGE** (1824-63). An

American soldier. He was born in Rockland (then a part of Thomaston), Me., and in early life served several terms in the State Legislature. At the beginning of the Civil War he joined the Union army as colonel of the Fourth Maine Volunteers. He participated in both the first and second battles of Bull Run, was made brigadier general in 1862, and in November of the same year became major general, but was killed while leading a bayonet charge on the second day of the battle of Chancellorsville.

BERRY, **MARY** (1763-1859). An English author, born at Kirkbridge, Yorkshire. She and her sister Agnes (who was 14 months her junior) had a remarkable association with Horace Walpole, beginning in 1788. In his letters Walpole spoke of both in terms of the strongest affection and endearment, in one instance addressing them as his "twin wives." It was solely for their amusement that he wrote his *Reminiscences of the Courts of Georges I and II* (1789). He established the sisters at Teddington, in 1789, and two years later he induced them to make their home at Little Strawberry Hill, the sometime residence of his friend Kitty Clive. It was said that Walpole was willing to marry either sister. His will provided for them by a bequest to each of £4000, and to both the house and property at Little Strawberry Hill. Mary Berry's literary productions include the comedy, *Fashionable Friends, England and France, a Comparative View of the Social Conditions in both Countries* (1844), and an edition of the *Works of Horace Walpole* (1798), collected and edited by her.

BERRYBONE FISH. A fish of the Scottish Devonian rocks representing a group (order *Arthrodra*, family *Coccosteidae*) allied to the lung fishes, but having the forepart of the body "protected by large bony plates, of which one pair is articulated by a hinge to the hinder part of the skull." These bones bear a pustular or berry-like sculpture. "The fore limbs were either rudimental or wanting, but a pair of pelvic fins was developed." See **DIPNOI**, and **PLATE OF DIPNOI AND CHILMERA**.

BERRYER, bɛʁʁiɛʁ, ANTOINE PIERRE (1790-1868). A French advocate, political leader, and orator. He was born in Paris and first distinguished himself by his defense of victims of the Restoration. In 1830 he was chosen deputy and ever afterward steadily represented the rights and policy of the elder Bourbons, at the same time he adhered to liberal principles and repeatedly undertook the defense of persons prosecuted by the government. It was he who defended Louis Napoleon after the Boulogne *attentat*. With the elder Bourbons he was in constant communication and was one of the heads of the Legitimist party who made a pilgrimage to the Comte de Chambord in London, in 1843. After the Revolution of 1848 he was elected to the National Assembly. He became a member of Louis Napoleon's privy council, but he nevertheless went to Wiesbaden in 1850 to do homage to the Comte de Chambord. When Changarnier was removed from his command, Berryer united with Thiers and others to oppose the pretensions of the President and boldly protested against the coup d'état. In 1854 he was elected a member of the French Academy. Berryer added greatly to his reputation as an orator by his defense of Montalembert (qv) against the government prosecution in November, 1858. In 1863 he was induced to enter the Corps Législatif. Berryer

was wonderfully effective both as a political orator and as an advocate

BERRYVILLE, A town, and the county seat of Clarke Co., Va., 60 miles west by north of Washington, D. C., on the Norfolk and Western Railroad (Map Virginia, G 2). It is in a fertile agricultural region, of which it is the commercial centre, has large deposits of iron ore, and carries on an extensive apple-raising industry. The town contains an excellent high school and library and owns its water works. Originally known as Battletown, Berryville occupied a place of considerable interest in the early history of the State. Pop., 1900, 938.

BERSAGLIERI, bër'sa-lyà-rè (It. pl of *bersagliere*, sharpshooter, from *bersaglio* a mark). A corps of infantry in the Italian army. They were originally formed and organized as a corps of riflemen or sharpshooters by Victor Emmanuel in 1850. Their first active service was with the Allies against the Russians in the Crimean War. In the battle of the Tchernaya, Aug. 16, 1855, the Russian attack was successfully and brilliantly repelled, largely by the gallantry of the Bersaglieri. At the naval battle of Lissa, July 20, 1866, where the Austrians under Tegetthoff defeated the Italians under Persano, a detachment of these riflemen were serving on one of the latter's ships, the *Re d'Italia*, which eventually was sunk. It is recorded that the Bersaglieri kept up an effective fire on the enemy until actually engulfed with their ship beneath the water. Their uniform is of dark green, with a felt hat, on one side of which is displayed their distinguishing badge of a full plume of cock feathers. Their strength in 1912 was given as 12 regiments, each regiment consisting of 3 battalions of 4 companies each, making a total of 14,072 under arms, 36,235 on unlimited leave, 18,764 mobile militia, and 32,391 territorial militia. The Bersaglieri regiments are noted for fast and sustained marching, excelling in this respect all other infantry in the world.

BERSEK, or **BER/SERKER** (Icel *berserkr*, cf. Eng. *bear + sark*, shirt, referring to the skins of animals which the ancient heroes wore). The name of a redoubtable hero in Scandinavian mythology, the grandson of the eight-handed Starkad and the beautiful Alfhilde. He despised mail and helmet and, contrary to the custom of those times, went always into battle without armor, his fury serving him as a coat of mail. By the daughter of King Swafurum, whom he had slain in battle, he had 12 sons, who inherited the name of Berserker, along with his warlike fury. The name "Berserker," among the early Norse people, was applied to a combatant whose love of fighting induced a frenzied state called the "berserker's course," in which he was dangerous to both friend and foe. In later times the title was given to companies of hard fighters who were retained as bodyguards or special champions of renowned Scandinavian leaders.

BERSEZIO, bër-sà'tsè-zì, VITTORIO (1830-1900). An Italian author, born at Peveragno (Piedmont). He was long active as an editor and was a voluminous writer of fiction, drama, and works of history. In his dialect play *Le miserie d'monsù Traoet* he realizes a genial creation of Piedmontese traits, the charm of which has a universal appeal. This play still survives on the Italian stage and in a German translation enjoyed great popularity in Berlin. One other

play, *La bolla di sapone*, has entered definitely into literature. Consult D. Orsi, *Il teatro in dialetto piemontese* (Milan, 1890).

BERSIER, bër'syà', EUGÈNE ARTHUR FRANÇOIS (1831-89). A pulpit orator of the Reformed Church of France. He was born at Morges, near Geneva, studied at Geneva, Göttingen, and Halle, and became a preacher in Paris in 1855. He died there Nov. 19, 1889. He was much admired as a preacher, and many of his sermons were published and translated into different languages. Besides these his publications embrace *Histoire du Synode de 1872* (2 vols., 1872), *Coligny avant les guerres de religion* (1884, Eng. trans., 1885), *La revocation, Projet de révision de la liturgie des églises réformées de France* (1888), *Histoire d'une petite fille heureuse* (1890), in English, *Sermons* (London, 1881-1901, with personal sketch of the author 1885-91). Consult J. F. B. Tilling, *Bersier's Pulpit. An Analysis of the Published Sermons of Pastor Eugene Bersier* (1901).

BERSOT, bër'sò', PIERRE ERNEST (1810-80). A French philosopher and publicist. He was born at Sverges (Charente-Inférieure), studied at the Normal School, Paris, and later taught philosophy at Rennes, Paris, Bordeaux, Dijon, and Versailles. He refused to take the oath after the coup d'état of 1851 and was dismissed from his post. In 1866 he entered the Academy of Moral and Political Sciences and in 1871 was appointed director of the Normal School. His works are profound and are written in an elevated style. They include *Essai sur la providence* (1853), considered his most important work, *Littérature et morale* (1861), and *Libre philosophie* (1868). His educational reports are also of interest. Consult E. Scherer, *Un moraliste, études et pensées d'Ernest Bersot* (2d ed., Paris, 1887).

BERT, bër', PAUL (1833-86). A French scientist and politician, born at Auxerre. He was professor of physiology in Bordeaux and afterward in Paris and was a member of the Academy of Sciences, was elected to the National Assembly in 1874 and was reelected in 1877 and became noted for extremely radical opinions. He advocated compulsory education and endeavored to exclude all religious teachings from the schools. In the short-lived Gambetta cabinet (1881-82) he was Minister of Public Instruction. Bert carried out many broad and interesting investigations in physiology, including researches on skin grafting, in the effects of increase and of diminution of atmospheric pressure upon the living organism, on respiration and asphyxia on the action of anesthetics, and on the toxic properties of oxygen. He published numerous scientific works, among which may be noticed *De la greffe animale* (1863), *La pression barométrique* (1878), *Discours parlementaires* (1881), *De l'éducation civique* (1883), *La morale des Jésuites* (reprinted, 1909). Consult Berillon, *L'œuvre scientifique de Paul Bert* (Paris, 1887).

BERTAUT, bër'tò', JEAN (1552-1611). A French ecclesiastic and poet, born at Caen. He early became connected with the Church and was largely instrumental in converting Henry IV to Catholicism, as a result of which he filled various important posts at court, such as secretary to the King and almoner to Marie de' Medici, Queen of Henry IV. During this period he wrote numerous pastorals, elegies, and other poems, many of which were translated into

Latin and Greek. But when he became Bishop of Sees, in 1606, he ceased to produce the light verse for which he was noted, and the poems that he wrote in his later years lacked the life and concert which marked his earlier efforts when he was a disciple of Desportes. He did prepare, however, in 1606, a new edition of his *Recueil de quelques vers amoureux*. He is the subject of a critical study in Sainte-Beuve's *De la poésie française au seizième siècle*, while his works have been edited by Cheneviers (1891).

BERTEAUX, bër'tô', HELENE HEBERT, MADAME LÉON (1825-1909). A French sculptor, born in Paris. She was the pupil of her father, the painter and engraver Pierre Hebert, and of Dumont. She was the founder and president of the Société de l'Union des Femmes Peintres et Sculpteurs, which since 1881 has held an annual exhibition in Paris, and for 15 years was a member of the jury on sculpture in the Société des Artistes Français. Among the most noteworthy of her works are a bronze group for a public fountain at Amiens, a "Young Gallic Prisoner" (1867, Museum of Nantes), an allegorical statue of sculpture (1869, Grenoble), the statue of Chardin (1881) on the façade of the Hôtel de Ville, Paris, and her masterpiece, "Psyche in the Realm of Mystery," which was awarded the gold medal at the Paris Exposition of 1889 and is now in the Museum of Cete.

BERTEAUX, HENRI MAURICE (1852-1911). A French statesman born at Saint-Maur-les-Fossés. He engaged in the business of stockbroking and made a fortune early in life. After serving as mayor of a small town, Chatou, he was in 1893 elected to the Chamber of Deputies as a Radical-Socialist and, having made a special study of military affairs, was chosen to head that committee of the chamber which presented the war budget in 1902. Two years later, when General André resigned the portfolio of the Ministry of War in the Combes cabinet, Berteaux was selected to fill the office. In the same capacity he continued to serve under Rouvier, but subsequently retired as minister. Thereafter he was reelected several times a deputy, was made president of the army commission of the chamber, and in 1905 vice president of the chamber itself. Again in 1911 he became Minister of War, this time in the cabinet organized by Monis, but on May 21 of the same year he was struck by a falling aeroplane and killed.

BERTHA. The name of several women, real and legendary, of the Middle Ages. St. Bertha, whose day is observed on July 4, was the beautiful and pious daughter of Charibert King of the Franks. She married (560 A.D.) Ethelbert, King of Kent, and became the means of his conversion and of the spread of Christianity among the Anglo-Saxons. In the romances of the Charlemagne cycle a Bertha with the Big Foot figures as the daughter of Count Charibert of Laon, wife of Pepin the Short, and mother of Charlemagne. In the romances of the Round Table another Bertha is a sister of Charlemagne and mother of the renowned Roland. Bertha, daughter of Burkhard, Duke of the Alemanni, and wife of Rudolph II, King of Transjurane Burgundy, after her husband's death, in 937 acted as regent for her infant son, Conrad. Subsequently she married Hugo, King of Italy, and died toward the close of the tenth century. She enjoyed the reputation of being an excellent housekeeper and is represented on monuments

of the times seated upon her throne with her spinning wheel by her side.

BERTHELOT, bër'tlô', PIERRE EUGENE MARCELLIN (1827-1907). A French chemist. He was born in Paris. He received his education at the Collège Henri IV and devoted himself to research in organic chemistry. In 1854 he received his doctor's degree in science, on presenting a remarkable thesis giving an account of his artificial reproduction of natural fats. The fact that fats are mixtures of glycerides, i.e., compounds of glycerin with the so-called fatty acids, had been known since 1823, when Chevreul effected the decomposition of fats into their chemical constituents. Berthelot, however, was the first to produce those important organic products synthetically. In the same thesis he showed that glycerin, which is capable of combining with three equivalents of a monobasic acid, is an alcohol, and thus the idea of polyatomic alcohols was first introduced into chemistry. A large number of diatomic, triatomic—in general, polyatomic—alcohols have since been prepared and form an important class of organic compounds (See ALCOHOLS). In 1851 Berthelot became assistant to Balard at the Collège de France, in 1860 he was made professor of organic chemistry at the Ecole de Pharmacie, and in 1865 a new chair of chemistry was founded for him at the Collège de France, where he was lecturer on theoretical chemistry. In 1873 he was elected member of the Institute, and in 1889 perpetual secretary of the Academy of Sciences. In 1876 he was made inspector general of higher education, in 1881 a life member of the Senate, in 1886-87 he was Minister of Public Instruction and in 1895-96 Minister of Foreign Affairs.

Berthelot was one of the most brilliant experimental chemists of our time. One of the pioneers of organic synthesis, he contributed to our knowledge of almost every class of carbon compounds, and the importance of his experimental researches on explosives and dyestuffs cannot be overestimated. He also furnished an immense number of experimental data concerning the phenomena of heat, which accompany chemical transformations, and the science of thermochemistry is largely based on his observations, although his theoretical interpretation of those phenomena has been proved to be erroneous. According to Berthelot, the heat evolved during a chemical reaction measures the power that causes the reaction. It has, however, been proved, both theoretically and experimentally, that while this principle holds good in many cases, it is by no means a general law, "a third principle of thermodynamics," as Berthelot to the end claimed it to be (See, however, NERNST'S HEAT THEOREM). Berthelot's published works include *Chimie organique fondée sur la synthèse* (2 vols., 1860), *Leçons sur les principes sucrés* (1862), *Leçons sur les méthodes générales de synthèse* (1864), *Leçons sur l'isomérisie* (1865), *Traité élémentaire de chimie organique* (1st ed., 1872, 4th ed., with Jungfleisch, 2 vols., 1898), *Sur la force de la poudre et des matières explosives* (1871, 1872, and 2 vols., 1883), *La synthèse chimique* (8th ed., 1897), *Essai de mécanique chimique fondée sur la thermochemie* (2 vols., 1879), *Les origines de l'alchimie* (1895), *La chimie au moyen âge* (3 vols., 1898), *Traité pratique de calorimétrie chimique* (1893), *Thermochemie, données et lois numériques* (2 vols., 1897), *Recherches expérimentales* (3 vols., 1901). He also published

many papers, on various scientific topics, in the *Comptes rendus de l'Académie des Sciences* and in the *Annales de chimie et de physique*. For his life, consult the *Popular Science Monthly*, May, 1885.

BERTHIER, bër'tya', ALEXANDRE (1753-1815) Prince of Neuchâtel and Wagram and marshal of the French Empire, born at Versailles. He fought under Lafayette in the American War of Independence. At the outbreak of the French Revolution he was appointed major general of the National Guard of Versailles, and rose to be a general of division and chief of staff in the Army of Italy, 1795, and three years later, in the absence of Bonaparte, proclaimed the Republic of Rome. He was Napoleon's chief of staff in the Egyptian campaign, and was Minister of War from 1799 to 1808. He was made Prince of Wagram for his part in the battle of that name. Berthier was Napoleon's proxy in the marriage of Maria Louisa in Vienna, 1810. Until 1814 he was constantly at Napoleon's side and was very valuable in superintending the movements of armies because of his activity, system, and insight. Napoleon recognized his good qualities, but claimed that Berthier was incapable of leading the smallest army corps alone. When the tide turned against Napoleon, Berthier's course was vacillating. After his surrender at Neuchâtel he made his peace with Louis XVIII, who gave him high positions. He retired to Bavaria on Napoleon's return from Elba. The manner of his death is uncertain. One story is that he committed suicide in a fit of insanity, another, that he was murdered by members of a secret society. He wrote *Relation des campagnes du général Bonaparte en Egypte et en Syrie* (1800) and *Relation de la bataille de Marengo* (1806). His *Mémoires* were published in Paris in 1827.

BERTHOLD VON REGENSBURG, bër'tolt fon rä'gens-buurg (c.1220-72). A German Franciscan preacher. He seems to have been born at Regensburg, where he received his education under David of Augsburg, a well-known teacher in the Franciscan monastery there. After 1250 he preached as an itinerant in South Germany, Switzerland, Austria, Bohemia, and Moravia, and after several years returned to Regensburg. He is buried in the cathedral there. In his preaching he departed from the Latin homily and formed his style largely on the best French models of the day. His sermons were usually preached in the open and were attended by great throngs of people. The best edition of Berthold's sermons is that by Pfeiffer and Strobl (2 vols., Vienna, 1862-80). There is also an edition in modern German by Gobel (Regensburg, 1873, revised, 1884). For his life, consult Unkel (Cologne, 1882).

BERTHOLET, bër'tô'la', ALFRED (1868-). A Swiss theologian, born at Basel. He studied at Basel, Strassburg, and Berlin universities. He became secretary of the Second International History of Religions Congress at Basel in 1904. His religious works include *Die Stellung der Israeliten und der Juden zu den Fremden* (1896), *Kommentare zu Leviticus, Deuteronomium, Ezechiel, Ruth, Esra, und Nehemia* (1897-1902), *Die Gefühle der Seligen* (1903), *Seelenwanderung* (1904), *Daniel und die Griechen Gefahr* (1907), *Ästhetische und Christenliche Lebensauffassung* (1910), *Die Jüdische Religion von dem Zeit Esras bis zu Zeitalter Christi* (1911).

BERTHOLET, bër'tô'la', COUNT CLAUDE LOUIS (1748-1822). A distinguished French

theoretical chemist. He was born at Talloire, a village of Savoy, near Annecy. He studied at the University of Turin and obtained a medical degree there in 1768. He afterward went to Paris, where he was appointed physician to the Duke of Orleans. He now applied himself with great assiduity to chemistry, in 1780 he was elected a member of the Academy of Sciences, and, some time after, the government made him superintendent of dyeing processes. In this situation he published a very valuable work on dyeing. In 1785 he announced his adherence to the antiphlogistic doctrines of Lavoisier, though he did not admit oxygen to be the acidifying principle, and herein he has proved to be right. In the same year he published a paper on "dephlogisticated marine acid"—now called chlorine—pointing out its use for bleaching purposes, and following up the experiments of Priestley, he showed ammonia to be a compound of three volumes of hydrogen gas and one volume of nitrogen. During the early part of the French Revolution Berthollet traveled through the country, giving instruction as to the best means of extracting and purifying saltpetre to be used in the manufacture of gunpowder, and also as to the process of smelting and converting iron into steel. In 1794 he became professor at the Ecole Normale. His joining the expedition of Napoleon to Egypt led to the formation of the Institute of Cairo. On his return from Egypt he was made a senator by Bonaparte, who also conferred on him several marks of honor and made him a count. Notwithstanding, he voted for the deposition of Napoleon in 1814. On the restoration of the Bourbons he was made a peer, but in spite of all these honors he remained simple, modest, and unassuming. In collaboration with Lavoisier and others, he devised the system of chemical nomenclature which is still, in its main features, employed to day. Berthollet was the first to introduce the idea of equilibrium into chemical philosophy. Since the time of Bergman it had been believed that the only factor determining the course of a reaction is the mutual chemical affinity of the reacting substances. Thus, when common salt (sodium chloride) is acted on by sulphuric acid, the latter takes up the sodium of the former, and hydrochloric acid is set free. According to Bergman's teaching, the cause of this phenomenon lies in the fact that sodium has a stronger affinity for sulphuric than for hydrochloric acid. Berthollet, however, advanced the view that, besides chemical affinity, there is another important factor upon which the course of a chemical reaction depends, viz., the relative masses of the reacting substances and of the products of the reaction. If hydrochloric acid, which is a gas, was not allowed to escape during the reaction and a certain mass of it would remain in the reacting mixture, then only part of it would be driven out of combination with sodium, so that when the reaction would reach the state of equilibrium, the mixture would contain, on the one hand, both sulphuric and hydrochloric acids in the free state, and, on the other hand, both the sulphate and the chloride of sodium. The development and application of Berthollet's idea form one of the most important chapters of theoretical chemistry and have thrown much light on chemical combination. Berthollet's principal work, *Essai de statique chimique*, in two volumes, appeared in Paris in 1803. Consult Cuvier, *Eloge de Claude Louis Berthollet* (Paris, 1826), and Muller, *Berthollet's Leben* (Erlangen, 1828).

BERTHOLLETTA, bër'thòl-lè'sh'i-a See BRAZIL NUT

BERTHOUD, bër'tòv', SAMUEL HENRI (1804-1891) A French author. He was born at Cambrai, where he edited the journal published by his father, entitled *La Gazette de Cambrai*. Afterward he removed to Paris, where he collaborated on *Le Monde* and on the *Revue des Deux Mondes*. He contributed to *La Patrie* a number of essays on natural science, under the pseudonym of *Sam*, which were subsequently collected in book form under the titles *Fantaisies scientifiques* (4 series, 1861) and *Petites chroniques de la science* (1867-71). He published several historical works, such as *Chroniques et traditions surnaturelles de la Flandre* (1831-34), a number of novels and many entertaining books for children, such as *La France historique, industrielle et pittoresque* (1835-47), and *Histoires pour les petits et pour les grands enfants* (1863).

BERTI, bër'tè, DOMENICO (1820-97) An Italian scholar and statesman. He became professor of ethics in the University of Turin in 1849. From 1870 to 1877 he was professor of philosophy in the University of Rome. He was Minister of Education in the La Marmora (1866) and Ricasoli (1867) cabinets, and Minister of Commerce from 1881 until 1884. He was a deputy almost continuously after 1849. He wrote numerous historical and critical studies, especially on Cavour, and on the Italian philosophers of the Renaissance. He also founded the papers *Rivista Italiana*, *Le Alpi*, and *L'Istituto*.

BERTILLON, bër'tè'yòn', ALPHONSE (1853-1914) A French anthropologist and criminologist, born in Paris. He devoted many years to the study of methods for the identification of criminals, and became head of the identification department of the Prefecture of Police, of Paris. In 1880 he founded his system of mensuration (See BERTILLON SYSTEM). He was made a chevalier of the Legion of Honor. His published writings on ethnology and criminology include *Ethnographie moderne, les races sauvages* (1883), *L'anthropométrie judiciaire à Paris en 1889* (1890), *La photographie judiciaire* (1890), *De la reconstitution du signallement anthropométrique au moyen des vêtements* (1892), *Identification anthropométrique (Instructions signalétiques, 1893)*, *La comparaison des écritures et l'identification graphique* (1897), *Anthropologie métique et photographique*, with Dr. A. Chervin (1909).

BERTILLON SYSTEM The name applied to a method of identifying criminals. Until very recently only general descriptions and photographs were employed, the result being that by slight disguises the appearance was so changed that criminals frequently escaped detection.

In March, 1870, Dr. Alphonse Bertillon, of Paris, invented and in 1885 published a plan for securing absolute identification. Three sorts of "signallements" (descriptions) are employed. A. Anthropometrical, based upon (1) the almost absolute immutability of the human frame after the twentieth year of age, (2) the extreme diversity of dimensions which the human skeleton presents when compared in different subjects, (3) the facility and precision with which certain dimensions of the skeleton may be measured. B. Descriptive, a general description. C. Peculiar marks, scars, deformities, etc. Of these marks an exact measurement is taken and their location accurately noted. The color of the eyes

is important, as this cannot be changed. Two photographs—one of the full face, the other of the profile—are taken by a camera screwed to the floor, and from a chair likewise fastened so that the relative proportion of height and size are exactly preserved in all pictures. The main reliance, however, is placed on the anthropometrical signalments, as these are never identical for two persons. The measurements taken are (the metric system is always used)

Body	{	Height (person standing)	
		Reach (outstretched arms—finger-tips to finger tips)	
		Trunk (height sitting)	
Head	{	Length and width	Length and width of right ear
		Length of left foot, left middle finger, left little finger, left forearm	

The measurements, with the other descriptions and the photographs, are put on cards of uniform size. These cards are classified, first according to sex. The cards are then distributed in three tiers of drawers, each tier made up of three drawers, according to the length of the head. The upper tier contains head lengths of 187 millimeters and less, the middle, those between 187 millimeters and 194 millimeters, the third, all above 194 millimeters. Ninety thousand cards would thus be roughly divided into tiers of 30,000 each. Each of these groups is subdivided according as the width of the head is narrow, medium, or broad, each division having about 10,000 cards. A further division, according as the length of the left middle finger is small, medium, or large, will reduce them to groups of 330 cards. Further analysis soon lowers the number of cards to something like 12 in each group. Thus to locate any card requires but a moment's effort.

The Bertillon system was introduced into the United States in 1887 by Major R. W. McClaughry. It met with a favorable reception and is rapidly being adopted in the larger penal institutions.

Such a system of absolute identification is a "necessary adjunct to the scientific administration of criminal law." It has a deterrent effect upon criminals, who know that if they are caught no disguise can conceal their identity. It enables the officers to distinguish the new from the old offender. It makes impossible the mistaking of an innocent person for some criminal to whom he bears a superficial resemblance. With the increased sentences for repeated offenses, this possibility of identification becomes of vast importance. That local institutions, police courts, etc., should keep such records is, however, not enough. Efforts are now being made to have the national government establish a central bureau for the collection of all the signalments of the criminals of the country. If the various nations adopted such a plan, the criminal would not escape detection by changing his abode. The discovery of the identity of the assassin of King Humbert through the Bertillon system is a striking proof of its utility. Penologists claim that the influx of foreign criminals in the United States in recent years is partly due to the adoption of the Bertillon system in European countries. It is stated that the larger proportion of the graver crimes are committed by persons not resident in the locality. Consult A. Bertillon, *Identification anthropométrique* (Paris, 1893), *The Bertillon System of Identification*, R. W. McClaughry, editor (Chicago,

1896), Boies, *The Science of Penology* (New York, 1901). See FINGER PRINTS

BERTIN, bër'tîn', ANTOINE (1752-90) A French poet, born on the Isle of Bourbon. He became a protégé of Marie Antoinette and of the Count of Artois and was styled by his contemporaries "the French Propertius." Toward the close of 1789 he undertook a journey to San Domingo, where he died on the day of his marriage to a young Creole girl, to whom he had long been attached. The latest complete edition of his works, containing his elegies, love poems, the famous *Voyage de Boulogne* (1777), was published in Paris in 1879, under the title of *Poésies et œuvres diverses*.

BERTIN, LOUIS FRANÇOIS (1766-1841) A French journalist known as Bertin aîné. He was born in Paris, began writing for the press in 1793, and in 1800, with his brother (also called Louis François), assumed the management of the *Journal des Débats*, founded in 1789 by Gaultier de Biauzat. Bertin's Royalist principles offended Napoleon and caused his banishment to Elba. With great difficulty he obtained permission to live in Italy until 1804, when he returned to Paris and resumed the editorship of the *Débats*, but was much hampered by Napoleon, who imposed on the paper the title of *Journal de l'Empire*, and by subjecting it to police revision, gave it almost an official character. When Bertin, in 1814, became free to follow his own bent, the journal reverted to its Royalist principles. During the Hundred Days it fell into other hands, till the return of the Bourbons restored it once more to Bertin, who, in the meantime, had taken part in the *Mouvement de Gand*. Though he did not join in the protest of the Liberal journals against the *ordonnances*, he gave his adhesion to the July Monarchy, and continued faithfully to support it.

BERTIN, LOUISE ANGELEQUE (1805-77) A French poet and composer, a daughter of Louis F. Bertin. She was born at Les Roches, near Bièvres, and cultivated successively painting, poetry, and music. She wrote the operas *Guy Mannering*, *Le Loupgarou* (Opéra Comique, 1827), which was well received, *Faust* (Italiens, 1881), and *Esmeralda* (text by Victor Hugo, Grand Opera, 1836). According to Halévy, she had "an abundance of ideas and often revealed a rare power of expression." Two volumes of poems from her pen, respectively entitled *Les Glanes* (1842) and *Nouvelles Glanes* (1876), were published. The former collection received the prize of the Academy.

BERTINI, bër-tî-nê, GIUSEPPE (1825-98) An Italian historical painter. He was born in Milan, where he studied with his father, a well-known designer of stained glasses, and attended the Academy of Art, he studied also at Rome and Florence. Of his paintings on glass, that representing Dante and the Divine Comedy, exhibited in London in 1853, and bought by subscription for the Ambrosian Library, is considered especially fine. Of his frescoes we note those of the Poldo-Pezzoli Museum, Milan, of his decorative pieces, the great curtain of the Scala Theatre, of his canvases "The Vision of St Francis of Assisi" (Santa Babila, Milan), "The Death of St Joseph" (Parochial Church of Palermo), "Torquato Tasso Introduced to the Duke of Ferrara." From 1859 he was professor in the Academy of Milan and director of the Brera Gallery.

BERTINI, HENRI JÉRÔME (1798-1876) A pianist and composer, born in London. He

played in public at the age of 12 and studied composition in Paris, where, from 1821 on, he devoted himself to teaching with signal success. In 1836 he retired to Meulan, France, where he lived in seclusion until his death. He is remembered for his valuable studies for the pianoforte in 29 sets, which have been edited by Hans von Bulow.

BERTOLONI, bër'to-lô-nê, ANTONIO (1775-1869) An Italian botanist. He was born at Saazana, Liguria, and studied medicine and botany at the University of Pavia. He became professor of physics at the Imperial Lyceum of Genoa in 1811 and remained there until 1816, when he was appointed to the same position at the University of Bologna. In addition to his principal work, *Flora italica* (10 vols, Bologna, 1833-54), and its continuation, *Flora italica, cryptogama* (1858-62), he wrote the following: *Prælectiones in herbaria* (1827), *Miscellanea botanica* (1842-63), *Plantæ novæ asiaticæ* (1864-65).

BERTON, bër'tôn', PIERRE MONTAN (1727-1780) A French musician. He was born in Paris, and at the age of 12 composed several motets, which were performed at the cathedral of Sens. He afterward became church organist and musical director at the Theatre of Bordeaux. Upon the death of Boyer, in 1755, he was called to Paris as director of the Royal Opera, where he contributed largely to the successful performance of the works of Gluck (qv) and Piccini. He is said to have given the impetus to the improvement of the modern orchestra. He wrote several operas and rearranged others by Gluck, Lullu, and Rameau.

BERTRAM. See RATRAMNUS

BERTRAM 1 A character in Shakespeare's *All's Well That Ends Well*. He is the haughty husband of Helena, who wins back his love first by disguising herself as his mistress, Diana, and then by exculpating him from the charge of her own murder. 2 The minstrel in Scott's *Castle Dangerous*, who makes a doughty guide for his charge.

BERTRAND, bër'tran', ALEXANDRE (1820-1902) A French archaeologist, born in Paris. He studied at the Normal School, and subsequently at the French College at Athens, and in 1862 was appointed director of the Museum of Saint-Germain. He is best known for his prehistoric studies. For a time he was an editor of the *Revue archéologique*, and he published *Essai sur les dieux protecteurs des héros, grecs et troyens dans l'Iliade* (1857), *Les voies romaines en Gaule* (1863), *La Gaule avant les Gaulois* (1891), and, with S. Remach, *Les Celtes dans les vallées du Pô et du Danube* (1894). Consult Henri Potez, *L'épique en France avant le romanisme* (1897).

BERTRAND, HENRY GRATIEN, COUNT (1773-1844) A French general. He was born in Châteauroux and entered the corps of engineers. He accompanied the expedition to Egypt and directed the fortification of Alexandria. Returning with the rank of general of brigade, he distinguished himself at Austerlitz and became the Emperor's adjutant, and after the battle of Aspern, in 1809, for establishing bridges over the Danube, he was created Count and Governor of Illyria. After sharing with credit in the subsequent campaigns he followed the Emperor to Elba, returned with him to France, and finally shared his banishment to St. Helena. After Napoleon's death Bertrand returned to France,

where, though sentence of death had been pronounced upon him—a sentence which Louis XVIII had revoked—he was restored to all of his dignities, and in 1830 was appointed commandant of the Polytechnic School. His sons published, in 1847, the memoirs dictated to him at St Helena by Napoleon.

BERTRAND, JOSEPH LOUIS FRANÇOIS (1822–1900) A French mathematician. He was born in Paris. After graduating at the Polytechnic School, he was attached (1842) to the Service of Mines and later became professor of mathematics and mathematical physics at the Polytechnic School, the Normal School, and the Collège de France, and a member of the Academy of Sciences (1856). In 1874 he was elected perpetual secretary of the Academy of Sciences and in 1884 a member of the French Academy. In 1867 he was appointed officer, in 1881 commander, of the Legion of Honor. He wrote treatises on arithmetic (1849), algebra (1850), calculus (1864), thermodynamics (1887), probabilities (1880), and a number of memoirs in the scientific journals.

BERTUCH, bër'toog, FRIEDRICH JUSTIN (1747–1822) A German author, bookseller, and publisher, born at Weimar. He studied theology and law at Jena, in 1775 was appointed cabinet-secretary at Weimar, and in 1785 Councillor of Legation. With Wieland and Schütz he planned the *Jenaische allgemeine Literaturzeitung*, to which he contributed from 1785 to 1805, and with Kraus he edited the *Journal des Luxus und der Moden*. His original writings, such as the tragedy *Elfrida* (1775), were of slight value, but he published a good translation of *Don Quixote* (6 vols, 1775–76), and a popularly successful compilation, *Bilderbuch für Kinder* (12 vols, 1790–1822). He made a world-wide reputation as a publisher of maps and geographical works. Consult Wilhelm Feldmann, *F. J. Bertuch* (Saarbrucker, 1902).

BÉRULLE, bër'ruł', PETER DE (1675–1629) A French Cardinal and statesman. He was born at the Château de Serilly, near Troyes, and first became conspicuous during the conference at Fontainebleau regarding the Protestants (1600). In 1613 he introduced into France the Carmelite Order, and founded the Congregation of the Oratory. He obtained a dispensation from the Pope sanctioning the marriage of Henrietta, the sister of Louis XIII of France, and the Prince of Wales (afterward Charles I), and subsequently accompanied the Princess to England (1625). As Ambassador to Spain he negotiated the Treaty of Mongon (1626), was created Cardinal in the following year, and afterward became Minister of State, a position which the jealousy of Richelieu soon made untenable for him. Bérulle freely bestowed his patronage on rising authors, and the publication of Lejay's *Bible Polyglotte* is ascribed to his influence. He was one of the first to appreciate Descartes. Bérulle's writings, several of which have been frequently republished, include the famous treatise entitled *Les grandeurs de Jésus*.

BERVIC, bër'vek', CHARLES CLÉMENT (properly BALVAY) (1756–1822) A French engraver. He was born in Paris, and studied under Le Prince and Wille. In 1784 he won fame by his engraving of Louis XVI, from the picture by Callet, one of the finest works of the French school. The engravings of the "Laocoon," of Regnault's "Education of Achilles," and of Guido's "Rape of Deianira" display equal

beauty of manipulation and higher power. In spite of the small number of his works, he is to be credited with having raised his art from the decay into which for the moment it had fallen in France.

BERWALD, bër'wäld, JOHAN FREDERIK (1788–1861) A Swedish violin virtuoso and composer. He was born in Stockholm and was a pupil of the Abbe Vogler. He traveled as a juvenile prodigy and was famous in Russia, Poland, Austria, and Germany, before he was 10 years old. In 1819 he became conductor in Stockholm and occupied this position until his death. Among his principal compositions may be mentioned three polonaises for pianoforte and violin, op. 1 (1791), a symphony for the orchestra (1790), three quartets for stunged instruments (1808), and several songs.

BERWICK A borough in Columbia Co., Pa., 27 miles southwest of Wilkesbarre, on the Delaware, Lackawanna, and Western Railroad, and on the Susquehanna River (Map Pennsylvania, J 4). It has iron works, flour, silk, and planing mills, and manufactories of pipe, cars, caskets, and pottery. Pop., 1910, 5357.

BERWICK, JAMES FITZ-JAMES, DUKE OF (1670–1734) A French marshal. He was the natural son of James II of England, by Ariabella Churchill, sister of the Duke of Marlborough. He was born in France, where he was educated and entered the army. After serving in Hungary under Charles of Lorraine, he returned to England shortly before the Revolution of 1688, which he evaded himself to prevent. In 1689 he accompanied his father in his Irish expedition, and after the death of St Ruth had the nominal chief command. He next served in Flanders under Marshal Luxembourg and afterward under the Duke of Burgundy and Marshal Villeroi. In 1705 he put down a rising of the Camisards of Languedoc with great cruelty. In 1706 he was created a marshal of France and sent at the head of an army to Spain, where he established the throne of Philip V by the decisive victory of Almanza. He fought all through the War of the Spanish Succession and led an army against Philip V in 1718. He received the command, in 1733, of an army intended to cross the Rhine. While besieging Philipsburg, he was killed by a cannon ball. Berwick possessed some of the best qualities of a great commander. His defensive campaign in 1709, in Provence and Dauphiné, was a triumph of strategy. His *Mémoires* were published in Paris in 1778. Consult also Wilson, *Duke of Berwick, Marshal of France* (London, 1883).

BERWICK, MISS MARY. A pen name used by Adelaide Anne Procter.

BERWICKSHIRE. A maritime and border county in the southeast division of Scotland, bounded north by Haddington, south and southeast by Roxburgh, Northumberland, and Durham, east by the North Sea, and west by Midlothian and Roxburgh (Map Scotland, F 4). Area, 457 square miles. Agriculture is the most important industry, and there are excellent fisheries. The manufactures include cloth, leather, beer, etc. The chief trade is in agricultural products. Berwickshire is naturally divided into three districts—the Merse, Lammermuir, and Lauderdale. The principal towns are Duns, the county town, Lauder, Eyemouth, a prosperous fishing station, Coldstream, Ayrton, and Earlstoun, the Ercildoune of Thomas the

Rhymer Pop 1801 30,200 1891, 32,200, 1901, 30,800 1911, 29,643

BERWICK-UPON-TWEED, bër'ik- (shortened from *iberwich*, from Celt *aber*, confluence of waters + Teut *wich*, Scand *wich*, dwelling, village) A seaport town in Northumberland, England, at the mouth of the Tweed, 58 miles south-southeast of Edinburgh (Map England, E 1) It is the frontier town of England and Scotland, and with its liberties comprising an area of about 8 miles, forms an independent borough and county, known since the Municipal Reform Act of 1835 as the "county of the borough and town of Berwick-upon-Tweed" For election purposes it is considered a part of Northumberland, and as such sends one member to Parliament The town has an antiquated and somewhat picturesque appearance It is girded with old fortifications and has large barracks Among its notable public buildings are the town-hall, dating from 1700, with a spire 150 feet high, and the Corn Exchange, built in 1858 Tweedmouth and Spittal (the latter a favorite watering place), on the south side of the Tweed, both within the municipality of Berwick, are reached by an old stone bridge, and a magnificent viaduct of 28 arches spans the river Its principal exports are grain, coal, ale, whisky, and fish, especially salmon Its principal imports are timber, iron, staves, salt, bone, tallow, oil, and hemp There are shipyards, and coal mines are worked near the town The town contains an iron foundry, in which mill machinery and steam engines are manufactured For the manufacture of agricultural implements, Berwick-upon-Tweed stands high Pop, 1891, 13,377, 1901, 13,437, 1911, 13,075

The history of Berwick-upon-Tweed is full of interest, especially in regard to the Border Wars Its authentic records begin in the reign of Alexander I, in the twelfth century, when it was the principal seaport of Scotland In 1296 Edward I captured the town and massacred 8000 of the inhabitants It was retaken in 1297 by the Scots, but the English soon regained it, and it remained in their hands throughout Edward's reign It was captured by Bruce in 1318, but was recaptured by Edward III after a siege in 1333 For over a century it suffered occasional attacks from the Scots, who held it for brief intervals, but in 1482 it passed finally into the possession of England

BERWYN, bër'win A city in Cook Co, Ill, 10 miles west of Chicago, on the Chicago, Burlington, and Quincy and the Illinois Central railroads (Map Illinois, E 2) Berwyn is purely a residential city and owns its water works Pop, 1910, 5841

BERYL (Lat *beryllus*, *berillus*, Gk βήρυλλος, *berýllos*, probably from Skr *barādārya*, originally brought from Vidura) A glaucum-aluminum silicate, which crystallizes in the hexagonal system It has a vitreous lustre and varies in color from an emerald-green to lighter shades of that color, and into light-blue, yellow, white, and sometimes rose-red There are two distinct varieties of this mineral The first is of a clear, bright, emerald-green color, which is due to the presence of a small amount of chromium, and is called emerald, this variety, however, must not be confounded with the Oriental emerald, which is a green variety of sapphire The finest specimens are found in isolated crystals and in geodes with calcite, quartz, and other minerals They come from New Granada,

Brazil, and Siberia, and from Alexander Co, N C, in the United States When cut, they are highly prized as gems Among the ancients the emerald was greatly esteemed as a prophylactic against epilepsy and a cure for dysentery It was supposed to guard the chastity of the wearer and to resent any trespass by breaking into pieces The emerald mines of Cleopatra are believed to have been in the mountain range that extends for a long distance parallel with the Red Sea and a few miles west of its coast, on the Nile The transparent varieties of beryl are called *aquamarine* They are found in various colors, and of a quality suitable for gems, in Brazil and Siberia, at Royalston, Mass., and at Stony Point, N C Large, coarse specimens of crystallized beryl, mostly hexagonal prisms, have been found at Acworth and Grafton, N H One specimen from Grafton weighed 2900 pounds The rose-red variety has recently received the name of *morganite* and is now cut into gems of considerable beauty See GEMS

BERYLLIUM See GLUCIUM

BERYX, bër'iks A genus of deep-sea fishes of tropical oceans, typical of a group *Berycoidei* and family *Berycidae* (See SILENT HEAD) One species, the "Alphonsine a costa cumpida" (*Beryx splendens*), is regarded as the most beautiful of Cuban fishes It is deep red with bright streaks See PLATE OF MULLETES AND ALLIES

BERZELIUS, *Swed* pron bër-tsi'll-i-us, JOHNS JAKOB, BARON (1779-1848) A Swedish chemist He was born at Westelösa, in Östergötland When a mere boy, he developed a liking for the experimental sciences, and after receiving his general education at the Gymnasium of Linköping and his professional training in medicine and chemistry at the University of Upsala, he devoted himself specially to investigations in chemistry In 1802 he went to Stockholm, teaching medicine and chemistry until 1806, when he was appointed lecturer on chemistry in the military academy In 1807 he became professor of medicine and pharmacy in Stockholm Shortly after, he was chosen member of the Stockholm Academy of Sciences, and from 1818 till his death held the office of perpetual secretary of the Academy The King raised him to the rank of baron, other honors from learned societies were conferred on him, and the directors of the Swedish iron works, in consideration of the value of his researches in their particular branch of industry, bestowed on him a pension for life In 1838 he was made a member of the Upper Chamber of the Diet, after having served in the Lower, but he took little part in politics The field of his activity lay in his laboratory, where he acquired a name of which his country is justly proud The science of inorganic chemistry rests in a great measure upon the discoveries and views of Berzelius His multiplied and accurate analyses established the laws of combination on an incontrovertible basis, and to him we owe the system of chemical symbols He discovered the elements selenium, cerium, and thorium, and first exhibited several elements, including columbium, tantalum, and silicon in the isolated state The blowpipe in the hands of Berzelius became a powerful instrument for the analysis of inorganic substances By methods of his own invention he analyzed large classes of compounds and accurately determined the equivalent weights of their chem-

real elements His celebrated electro-chemical theory was for many years universally considered as explaining the true cause of chemical combination It had been known since 1803 that, when an electric current is passed through the solution of a salt, the latter is decomposed and two substances are produced—a base and an acid, the former separating at the negative, the latter at the positive pole This suggested the idea that chemical combination might be due to electrical attraction In 1812 Berzelius consequently advanced a general theory of chemical combination based on the assumption that the atoms of the several elements, as well as certain groups of atoms, are charged with electricity, some being electro-positive, others electro-negative To hydrogen was assigned a central position among the elements, since by combining with other elements it was capable of yielding both electro-negative and electro-positive substances, further, the extreme electro-positive position was assigned to the metal potassium, the extreme electro-negative position to the “non-metal” oxygen Different compounds formed by the combination of chemical elements were, according to this theory, capable of exercising further electrical attraction upon one another and therefore of combining into relatively complex substances Thus, the electro-negative SO_2 (then called *sulphuric acid*) could combine with the electro-positive group K_2O (potassium oxide), to form the salt known as potassium sulphate Similarly, the group SO_2 combined with the group MgO (magnesium oxide) to form magnesium sulphate Again, potassium sulphate is more electro-positive than magnesium sulphate, since the metal potassium is more electro-positive than the metal magnesium, the two sulphates could therefore combine to form potassium-magnesium sulphate This dualistic electro-chemical theory was abandoned in the thirties However, the theory of electrolytic dissociation, developed within recent years, may lead to a revival of Berzelius' views, though probably in a considerably modified form (See DISSOCIATION) Berzelius' published works include *Nova Analyse Aquarium Medeviensium* (Upsala, 1800), *Foreläsningar i djurkemi* (2 vols, Stockholm, 1806-08), *Öfversigt af djurkemien framsteg* (Stockholm, 1812), *Afhandlingar i fysik, kemi och mineralogi* (6 vols, Stockholm, 1806-18), *Om bildorsets användande i kemi och mineralogi* (Stockholm, 1820) His celebrated *Larobok i kemi* was originally published at Stockholm in three volumes (1808-18), a second edition, in six volumes, was published between 1817 and 1830, the work has been translated into most of the European languages The multitude and accuracy of Berzelius' researches in every branch of chemical inquiry make it difficult to conceive how one man could have accomplished so much Consult his “Obituary,” in *American Journal of Science*, November, 1848, Louyet, *Notice sur la vie et les travaux de J J Berzelius* (Brussels, 1849), Soderbaum, *Berzelius, Werden und Wachsen* (Leipzig, 1899)

BERZSÉNYI, bé-zh'nyí, DANIEL (1776-1836) A Hungarian poet, born at Hetye, county of Eisenburg His *Verses* appeared in 1813, without his consent, under the editorship of Helmecci These poems, an authorized edition of which was published under the direction of the author in 1816, were cordially greeted,

especially by the younger patriots, and have become classic in the literature of Hungary The most recent edition is that by Toldy (2 vols, Pesth, 1864)

BES An Egyptian divinity, presiding over art, music, the dance, and childbirth, represented as a grotesque, deformed dwarf and formerly identified with Typhon He is of foreign origin, appearing chiefly after 1500 B.C.

BESANCON, be-zan'son' (LL *Besantio*, Lat *Vesontio*) The capital of the French department of Doubs, and formerly of Franche-Comté, a fortress of the first class and seat of an archbishopric, situated on the river Doubs, 57 miles east of Dijon (Map France, N, M 5) The city proper lies on a peninsula which is almost entirely surrounded by the Doubs, on the height which forms the neck of the peninsula lies the citadel Besancon has many remarkable buildings and Roman remains There is a Roman amphitheatre in ruins, whose vast proportions suggest the ancient importance of the city The cathedral is a striking structure, dating from the eleventh century The Prefecture belongs to the year 1697, and the palace of Cardinal Granvella, the minister of Charles V, is an interesting example of half-Gothic, half-Romanesque architecture The gate of Mars, or Porte Noire, is a triumphal arch, built in 167 A.D. by Marcus Aurelius Besancon was strongly but irregularly fortified by Vauban in the seventeenth century, the citadel being considered impregnable Since that time the fortifications have been extended and strengthened The present fortifications consist of the citadel of Vauban, with recent additions, which occupies the site of the ancient Roman stronghold, 1200 feet above sea level Forts are also built on the neighboring heights The city is an important industrial centre, the principal product being hardware, but there is great activity in the weaving of silk, linen, and cotton One-fifth of the population is engaged in the manufacture of timepieces Pop, 1901, 48,178, 1906, 56,163, 1911, 57,978 Vesontio, or Visontium, the capital of the Segunni, was a considerable place in the time of Caesar, who in 58 B.C. expelled its inhabitants and in the neighborhood of the city gained a victory over Ariovistus It then became an important Roman military station Marcus Aurelius made it a *colonia* with the name of *Colonia Victoria Sequanorum* In modern times, after undergoing many changes, it finally came into possession of France in 1674 Consult A Castan, *Besancon et ses Environs* (Besancon, 1887), *Besancon et la Franche-Comté, notices historiques* (Besancon, 1893), T Rice Holmes, *Caesar's Conquest of Gaul* (Oxford, 1911)

BESANT', or **BEZANT'** A circular piece of bullion, generally gold, without any impression, supposed to represent the old coinage of Byzantium brought home by the Crusaders and hence of frequent occurrence as heraldic charges It was current in England and on the Continent long after the Crusades Besants are generally introduced into the arms of banks, and also into those of individuals who have been specially connected with money Similar figures, when not colored or ('gold'), or *argent* ('silver'), are known in heraldry by the general term of *roundels* A *bezanty cross* is a cross composed of besant, and bezanty, or *besante*, is a term used when the shield or any particular charge is strewn with besants

BESANT, bes'ant, Mrs ANNIE (1847-) An English theosophist. She was born in London, Oct. 1, 1847, began life as a devout ritualist, married the Rev. Frank Besant, 1867, but soon afterward became an avowed free-thinker, was separated from her husband in 1873 and in 1874 joined the National Secular Society. Here she met Charles Bradlaugh, with whom she published a pamphlet, *The Fruits of Philosophy* (1877), which led to the arrest of the authors for alleged immorality, because they discussed plans for controlling the increase of population. After much litigation they were acquitted. In 1889 she joined the Theosophical Society and became an ardent disciple of Madame Blavatsky, and since then has devoted herself to the propaganda of theosophy throughout the world, president of the Theosophical Society (1907). In 1898, she founded the Central Hindu College in Benares, India. With Herbert Burrows she compiled a *Petit glossaire de termes théosophiques* (Paris, 1894). In 1893 she made a lecturing tour in the United States and published her autobiography under the title *Through Storm to Peace*. Her later works include *The Building of Kosmos* (1894), *The Self and its Sheaths* (1895), *Four Great Religions* (1897), *Esoteric Christianity, or, the Lesser Mysteries* (1902), *Theosophy and the New Psychology* (1904), *The Wisdom of the Upanishads* (1906), *Legends and Tales* (1913), *Essays and Addresses* (vol. 1, 1911, vol. 2, 1912, vols. 3 and 4, 1913).

BESANT, bez'ant, SIR WALTER (1836-1901). An English novelist and critic. He was born in Portsmouth, Aug. 14, 1836, the son of William Besant. He was educated at King's College, London, and at Christ's College, Cambridge, and was appointed senior professor in the Royal College of Mauritius (1861-67). Returning to London on account of ill health, he formed a successful literary partnership with James Rice. They produced together many excellent novels, beginning with *Ready Money Mortiboy* (1872) and ending with *The Seamy Side* (1881). After the death of Rice (1882) Besant wrote a large number of novels, of which the most notable is *All Sorts and Conditions of Men* (1882), dealing with the social conditions in the East Side of London. This novel presented so clear a picture of the real life and limited opportunities of the common people of East London that it led to the establishment of the People's Palace. The work gave an impetus to many other attempts at social reform and assisted its author to an abiding place among the social reformers of his generation. Among his other novels are *Dorothy Foster*, *Children of Gibeon*, *Armored of Lyonesse*, *The City of Refuge*, *The Demoniac*, a striking study of hereditary dipsomania, and *The Orange Girl*. Besant also did an immense amount of miscellaneous writing, which included a valuable historical work on London. He founded the Society of Authors, becoming its first chairman (1884-85), and the editor (1890) of the *Author*, official organ of the society. In 1895 he was knighted. He died at Hampstead, June 10, 1901. (See PEOPLE'S PALACE.) Consult *Autobiography* (New York, 1902).

BESIDE/ THE BONNIE BRI'AR BUSH A collection of tales of Scotch life (1894), by Ian Maclaren, the pen name of the Rev. John Watson, which excited wide interest and made the author famous. The types of lowly life in

these stories have been developed in other stories by the same author.

BESIKA BAY, bë-së'ka. An inlet of the Aegean Sea, of strategic importance, on the northwest coast of Asia Minor, a little south of the entrance to the Dardanelles (Map: Turkey in Asia, B 3). The island of Tenedos lies at the mouth of the bay. The English fleet was stationed there during the crisis of the Russo-Turkish War in 1853-54 and again in 1877-78.

BESKOW, bë'sköv, BERNHARD VON (1796-1868). A Swedish poet and dramatist, born in Stockholm. He was appointed private secretary of the Crown Prince Oscar in 1825 and subsequently held several offices at court. His more important works include the poems *Karl XII* (1819) and *Steniges anor*, and the tragedies *Erik den Fjortonde* (1827-28), *Torhel Knutsson* (1830), and *Birger och Lars Att* (1836-38).

BESNARD, bas'nar' (PAUL) ALBERT (1849-) One of the prominent French contemporary painters. He was born at Paris, June 2, 1849, and studied with Jean Bremond, and with Cabanel in the Ecole des Beaux-Arts. In 1874 he won the Roman prize, and thereupon spent the customary four years in Italy. From 1879 to 1881 he practiced portrait painting in London, among his sitters being Lord Wolsley and other prominent representatives of the British army and navy. He then took up his residence in Paris. His earliest portraits, like that of Legros (1881, Musée de Luxembourg) and that called "Madame Lerolle and her Little Daughter" (1883), are in the grayish white tone of Bastien-Lepage (qv), but he speedily took up the problems of light then occupying the Impressionists and solved them in his own individual manner. Among his most important works of his character are the portrait of Madame Roger Jourdin, which was epoch-making in his art, a "Nude Woman Warming Herself" (1887, Luxembourg), "The Artist's Family" (1890), the "Harbor of Algiers" (1895, Luxembourg), "Madame Réjane" (1898), "Noon Women Bathing", "Princess Mathilde" (1904), the "Caryatides" (1907, Brussels Museum), "An Evening" (1908). An admirable treatment of light and color is evident also in his mural decorations. Through them he gained the reputation of being the first painter to express adequately the great achievements of modern science. Among the most prominent of his decorations, all mentioned being in Paris, are a whole series for the Ecole des Pharmacies (1887 et seq.), "Life Reborn from Death" in the chemical amphitheatre of the Sorbonne (1888), "Truth attended by the Sciences Enlightening Man," a ceiling decoration in the Hôtel de Ville (1890-91), "The Happy Isle," etc., in the Musée des Arts Décoratifs, and (1913) a decoration for the ceiling of the Théâtre Français.

Besnard was a wide traveler and brought from Spain and Algiers admirable specimens of his art, but his greatest undertaking was his journey to India in 1911. He brought back incomparable pictures of the exotic color and the interesting life of that country. They are masterpieces of most intense color, often in a single tone, such as his "Weeping Woman," painted entirely in red. Other excellent examples are the "Steps at Benares," "Indian Dancing Girl," "The Bracelet Merchant," "The Rock-Cut Temple of Trichinopoly," "A Palace on Lake Udaipur." The exhibition of his Indian works

in Paris in 1912 attracted international attention. A large and representative exhibition of his works was held early in 1913 in the Boston Museum of Fine Arts and afterward in other American museums. The artist was engaged in 1914 upon mural paintings for the Peace Palace at The Hague. He is also a pastelist and engraver of note.

Besnard enjoys the distinction of having satisfactorily united the achievements of the Impressionists in light and color with whatever is really sublime and permanent in classic tradition, he has resumed the historic mission of French painting to express in form and color the intellectual and spiritual achievements of the nation. His clear and precise drawing is directed to reveal continuous change of form, his color is powerful and striking, he is a clear-headed thinker as well as a painter, and his profound knowledge of human psychology and life is especially shown in his portraits. Consult Marx, *The Painter Albert Besnard* (Paris, 1893), and Mouney, *Albert Besnard* (ib., 1906), with 100 illustrations and literary contributions by the artist.

BESS, GOOD QUEEN The rather indulgent name applied to Queen Elizabeth of England.

BES'SARABIA (after the family Bessarabia, which gave Vorodes to Wallachia). A government in the extreme southwest of Russia, bordering on Rumania on the west and south, and the Black Sea on the southeast (Map Russia, E 5). It is bounded on the east by the Dniester, on the west by the Pruth, and on the south by the Danube. It covers an area of 36,825.3 square versts (16,181 square miles) without the greater internal waters, and is country mostly flat, except for some well wooded offshoots of the Carpathian Mountains in the northwest. It is intersected by several streams, which add to its fertility. The chief occupations are cattle breeding and gardening, especially vine growing, and the production of wine. Wheat, barley, and corn are raised to some extent, as well as tobacco, flax, and hemp. The manufactures of the province are insignificant, but its commerce, owing to its proximity to the frontier, is considerable, consisting largely of exports of cattle, wool, tallow, etc. The population, which is very heterogeneous and composed of Moldavians, Little Russians, Poles, Rumanians, Bulgarians, Jews, Armenians, Greeks, and Tatars, numbered 2,490,200 in 1911 (estimate of January 1), of whom 2,125,000 were rural. The capital is Kishinev. Bessarabia, alternately in the power of the Turks and the Nogais after 1503, suffered heavily in all the wars with Russia previous to the nineteenth century. It was ceded to Russia in 1812. By the Treaty of Paris of 1856, the portions of Bessarabia lying along the Pruth and the Danube, 4250 square miles, were assigned to Moldavia, but at the Berlin Congress of 1878, 3580 square miles were restored to Russia.

BESSARION, JOHANNES, or BASILIUS (1395-1472). A Greek scholar. He was born at Trebizond, on the Black Sea, 1395. He is remembered as one of the earliest of those scholars who in the fifteenth century transplanted Greek literature and philosophy into the West and rescued the mind of Christendom from the trammels of scholasticism. Bessarion imbibed his love of Plato's writings from his tutor, Gemistus Pletho. He became a Basilian monk, in 1437 Archbishop of Nicæa, and in

1438 accompanied the Greek Emperor, John VII Palæologus, to Italy, and effected, at the Council of Florence in 1439, a union between the Greek and Roman churches, which, however, was of short duration. Soon afterward he joined the Roman church, but always retained a glowing love of his native land. He was made Cardinal by Pope Eugenius IV in 1439. Ten years after Nicholas V created him Cardinal Bishop of Sabina, and in the same year Bishop of Fiasecati. He was papal legate at Bologna (1451-55). After the fall of Constantinople (1453) Bessarion visited Germany, and at the diets of Nuremberg, Worms, and Vienna endeavored to promote a crusade against the Turks. In 1463 he was made titular Patriarch of Constantinople by Pius II. In philosophy he professed to be a follower of Plato, but without depreciation of Aristotle. His writings consisted of Latin translations of Greek authors, etc. He died at Ravenna, Nov. 19, 1472. Consult *Inventaire des manuscrits grecs et latins donnés à Saint-Maro de Venise par le cardinal Bessarion en 1468* (Venice, 1894), and for his life, Henri Vast (Paris, 1878). His works are in Migne, *Pat. Gr.*, clxi.

BESSEGES, bē'sēzh'. A town in the department of Gard, France, on the Ceze River, 34 miles northwest of Nîmes (Map France, S, J 4). It is in an important coal field and has foundries, funaces, and glass works. Pop., 1901, 9040. 1911, 8030.

BESSEL, FRIEDRICH WILHELM (1784-1846). An eminent German astronomer. He was born at Minden, in Westphalia. He was destined by his father for a commercial life, but at a very early age he exhibited an unconquerable fondness for astronomy. Though he yielded to his father's wishes and entered a mercantile house in Biemen, he worked continually at astronomy, and it was not long before it became evident that no career but that of an astronomer would suit him. His undivided attention once turned to science, he achieved speedy success. In 1810 he was director of the observatory at Königsberg and professor of astronomy. Realizing the necessity of a systematic revision of the observations of his predecessors, he worked out his theory of instrumental errors and applied it to the reduction of the observations made by Bradley at Greenwich from 1750 to 1762. His results were embodied in his *Fundamenta Astronomiæ*, published in 1818, a work which marks an epoch in the progress of astronomy. His final improvements in reduction methods appeared in 1830 in his *Tabula Regiomontana*. His important contributions are too numerous to mention here. The most startling was perhaps his determination of the parallax of 61 Cygni. By this remarkable achievement, which was the first measurement of a star's distance from the solar system, Bessel inaugurated a new era in sidereal science. His industry as an observer was such that during the years 1821-33 he brought the number of accurately known stars up to 50,000, and thus laid the foundation for the great *Bonn Durchmusterung*, which was carried out by his pupil and successor, Argelander.

It is not too much to say that Bessel was the father of modern observational astronomy, and there is scarcely a department of this science that was not improved or perfected by him, and in mathematical astronomy his work was almost equally important. Among other achieve-

ments, he added Bessel's Functions to the resources of the mathematical physicist, and he was one of the first (1823) to consider scientifically the personal equation of observers. Besides the works mentioned above, his writings include *Astronomische Untersuchungen* (2 vols, 1841-42) and *Abhandlungen* (4 vols, 1875-82). Consult Herschel, *A Brief Notice of the Life, Researches and Discoveries of F W Bessel* (London, 1847), Durege, *Bessels Leben und Wollen* (Zurich, 1861).

BESSELS, bés'sels, EMIL (1847-88) A German scientist. He was born at Heidelberg and studied at the universities of Jena and Heidelberg. In 1869 he made his first polar journey, in the course of which he demonstrated the existence of the Gulf Stream to the east of Spitzbergen. In 1871 he accompanied the expedition under C F Hall (qv), as ship's physician and chief of the scientific department. His collections were lost in the wreck of the *Polaris*. He published *Scientific Results of the United States Arctic Expedition* (1876) and *Die amerikanische Nordpolexpedition* (1878).

BESSEMER A city in Jefferson Co, Ala, 13 miles by rail southwest of Birmingham, on the Queen and Crescent, the Atlantic, Birmingham and Atlanta, the Illinois Central, the Frisco Lines, the Seaboard Air Line, the Birmingham Southern, the Louisville and Nashville, and the Southern railroads (Map, Alabama, B 2). Iron and coal mines are in the vicinity, and the city is noted for the number and variety of its works devoted to the production of iron and steel in various forms. The manufacture of fire and building brick is another important industry. The city contains a Carnegie library and the Elizabeth Duncan Hospital. Bessemer is governed by a mayor, elected biennially, and a board of aldermen, elected on a general ticket. Pop, 1900, 6358, 1910, 10,864.

BESSEMER A city and the county seat of Gogebic Co, Mich, 47 miles east of Ashland, Wis, on the Chicago and Northwestern, the Duluth, South Shore, and Atlantic, and the Minneapolis, St Paul, and Sault Ste Marie railroads (Map Michigan, F 2). It has a picturesque location and contains a fine high school, city hall, and brownstone courthouse. The city is the centre of the productive Gogebic iron range and is engaged principally in iron mining and lumbering. The surrounding region is adapted to the raising of grain, hay, and some fruit. Pop, 1900, 3911, 1910, 4583.

BESSEMER, SIR HENRY (1813-98) An English inventor, who originated and successfully developed the process for making steel known by his name. He was born at Charlton, near Hitchin, England, and acquired his early education in the schools of the neighborhood. His father, a mechanical engineer and inventor, owned a type foundry, and in this establishment the son received a mechanical training. He inherited from his father artistic talent and was skillful at modeling, designing, and painting. He early turned his attention to mechanical inventions, and his first successful scheme was a method of impressing on deeds and other documents the stamps of the internal revenue office, which at that time could be forged readily. Of such marked excellence was this invention that it was straightway appropriated by the revenue office, without compensation to the inventor, in spite of his strenuous efforts to se-

cure justice. Later in life, when he had achieved success and honor, he brought this matter to the attention of the government and was knighted (1879) as a tardy recognition of the value of his early invention. Bessemer's next work of importance was that of a new method of producing bronze powder, or "gold" paint, which was successful from a commercial point of view, and supplied him with resources to carry on his metallurgical researches. He was greatly interested in the production and manipulation of alloys, doubtless on account of his father's business as a type-founder, and though without a scientific training, he was a careful, ingenious, and determined investigator. During the Crimean War, in common with many other inventors, he was engaged in experiments looking to the improvement of cannon, and designed an elongated projectile so shaped and perforated as to revolve in its flight through the passage of air and powder gases. For the discharge of such a projectile he found that the cannon of that period would not resist the strain, and accordingly he determined to carry on experiments with a view to producing iron of greater strength. Working in Paris, with the encouragement of the Emperor Napoleon, he produced an improved form of cast iron and was then led to further refine the iron until steel was produced. Patents were taken out in connection with these ideas in 1855, and the experiments were continued, so that Bessemer soon (in his own words) "became convinced that if air could be brought in contact with a sufficiently extensive surface of molten crude iron, the latter would rapidly be converted into malleable iron." As a result of numerous experiments followed the "converter" (qv), which, along with the other apparatus, was installed in 1856 at his bronze factory in London, and steel ingots were produced which were successfully rolled into rails without hammering. After the process was developed, the Bessemer Steel Works in Sheffield were erected, and were soon producing a large output, as well as training competent workmen to carry on similar factories in other parts of the world. On Aug 13, 1856, Bessemer read a paper at the Cheltenham meeting of the British Association, on "The Manufacture of Malleable Iron and Steel without Fuel," and in 1865, at the Birmingham meeting, he read another important paper "On the Manufacture of Cast Steel, its Progress and Employment as a Substitute for Wrought Iron." The growth of this process (see IRON AND STEEL, METALLURGY OF) was not only marked in itself, but it had a widespread effect in greatly cheapening the price of steel and making it available for railway and other engineering work.

In addition to his success in steelworking, which brought him renown and fortune, Bessemer had other inventions to his credit, among which were a method for compressing into a solid block the graphite used in the manufacture of lead pencils, which is still in use, a method for casting type, using a force pump to drive the metal into the mould, a system of rollers for embossing and printing paper, a machine for embossing velvet, and a ship with a cabin which would remain in a level position. The latter, on which Bessemer spent much money, was, however, a complete failure, though Bessemer claimed that his appliance was never given a fair trial. In 1859 Bessemer

received his first honor, in the form of the Telford medal of the Institute of Civil Engineers, and in 1872 he received the Albert medal of the Society of Arts. In 1871-73 he was president of the Iron and Steel Institute of Great Britain, and in 1879 he was made a fellow of the Royal Society. He was on honorary member of many foreign engineering and scientific societies, including the American Society of Mechanical Engineers, before whom, in December, 1896, he presented a paper on "The Origin of the Bessemer Process," which was printed in the *Transactions* of that society. Consult his *Autobiography*, with a concluding chapter by his eldest son (London, 1905).

BESSEMER-STEEL PROCESS See IRON AND STEEL, METALLURGY OF

BESSENYEI, bé'shén-yéi, GYORGY (c 1747-1811) An Hungarian dramatist. He was born at Bercezl, county of Szabolcs. After a brief and fragmentary course of study he led an idle life until 1765, when he was chosen, with other young nobles, to form Maria Theresa's Hungarian bodyguard at Vienna. In the brilliant and cultured world into which he was thus suddenly introduced, Bessenyei soon realized his own deficiencies and applied himself day and night to studies. With the knowledge of other languages and literature came also the realization that his race had been surpassed by other nations, both in culture and refinement. Spurred by this thought, he soon formed within the royal bodyguard a literary circle which was rooted in French classicism and bore the seeds of the modern Hungarian renaissance. Bessenyei was an enthusiastic admirer of Voltaire and took upon himself to imitate him. Bessenyei himself was surprisingly prolific and versatile. His earliest work was a tragedy, *Agas*, drawn from Spaitan history (Vienna, 1782), with which the historians of Hungarian literature are wont to begin its period of modern Renaissance. Other tragedies followed, based upon Magyar traditions, then came comedies, imitated from the French, one of which, *The Philosopher* (1777), was the first true comedy written in the Hungarian language, an epic, *King Matthias*, and a series of prose works in the field of history and philosophy, including a *Life of John Hunyadi* and a *Philosophic History of Hungary*. Until 1784 Bessenyei lived in Vienna, where he had charge of the court library. After that year he retired to his small country seat, where he lived quietly, paying small heed to the development of literary tendencies which he himself had set in motion, yet not wholly ceasing from his labors until his death, in 1811. Many of his works have remained in manuscript form, as the censorship of Francis I could not tolerate Bessenyei's cult of liberty and reason.

BESSEY, bé'ssé, CHARLES EDWIN (1845-) An American botanist, born at Milton, Ohio. He graduated in 1869 at the Michigan Agricultural College, studied at Harvard under Prof. Asa Gray, in 1872 and 1875-76, and was professor of botany at the Iowa Agricultural College from 1870 to 1884. In 1884 he was appointed professor of botany and in 1909 head dean at the University of Nebraska. He published *The Geography of Iowa* (1876), *Botany for High Schools and Colleges* (1880), *The Essentials of Botany* (1884), *Elementary Botany* (1904), *Plant Migration Studies* (1905), *Synopsis of Plant Phyla* (1907), *Outlines of*

Plant Phyla (1909). The ninth edition of his *New Elementary Agriculture* (written with others) was published in 1911.

BESSIÈRES, bé'syâr', JEAN BAPTISTE (1768-1813) Duke of Istria and marshal of the French Empire. He was born at Preissac, in the department of Lot, and after serving for a short time in the "Constitutional Guard" of Louis XVI, entered the Army of the Pyrenees as a private soldier in November, 1792. In less than two years he had attained the rank of captain, and, passing into the Army of Italy, he distinguished himself greatly in the battles of Roveredo and Rivoli. He was made chief of a brigade in 1798 and in that year accompanied Bonaparte to Egypt and gained distinction at the siege of Acre and at the battle of Abukir. Afterward he took a prominent part in the greatest battles of Napoleon—Marengo, Austerlitz, Jena, Friedland, Eylau, Eckmühl, Aspern, and Wagram—and within five years (from 1800 to 1805) he was made successively general of brigade, general of division, and marshal of France. For his gallant behavior in Spain he was in 1809 created Duke of Istria. In the Russian campaign he commanded the cavalry of the Guard, and during the disastrous retreat from Moscow the services he rendered were of the utmost importance. In 1813 he received the command of the whole of the French cavalry. On the morning of the battle of Lützen, while reconnoitring the field from the defile of Rippach, he fell mortally wounded. Napoleon justly mourned his loss as one of his ablest generals and truest friends. Bessières was a great leader, beloved by his soldiers and even by his Spanish opponents.

BEST, WILLIAM THOMAS (1826-97). An English organist, born at Carlisle. He received his first appointment at Pembroke Chapel, Liverpool, and in 1849 was appointed organist of the Liverpool Philharmonic Society. Subsequently he was organist of the Panopticon, London (1852), of Lincoln's Inn Chapel (1854), and of St George's Hall, Liverpool (1855). Best was practically his own instructor, and in the course of his long and extremely active career he succeeded in carrying his art to a point of perfection unsurpassed by any other man. His repertory is said to have numbered 5000 pieces. He composed numerous anthems, fugues, sonatas, prepared very many arrangements for the organ, and published *The Modern School for the Organ* (1853) and *The Art of Organ-Playing* (1869).

BESTIARIES (Fr. *bestiaires*, from Lat. *bestiarum*, pertaining to wild beasts, from *bestia*, wild beast). The name given to a class of written books of great popularity in the Middle Ages, describing the animals of creation, real or fabled, and generally illustrated by drawings. They were most in fashion during the eleventh, twelfth, and thirteenth centuries. They served as encyclopedias of the zoology of those ages, but they had also another use. The symbolism which was then so much in vogue fastened spiritual meanings upon the several animals, until every quality of good or evil in the soul of man had its type in the brute world. It is in this way to the Bestiaries that we must look for explanation of the strange grotesque creatures which are found sculptured on the churches and other buildings of the Middle Ages. There were Bestiaries both in prose and in verse, in Latin and in the vernacular. A few sentences from *Le bestiaire divin de Guillaume, clerc de Nor-*

mandie, trouvere du XIIIe siecle (Caen, 1852) may help to give some notion of the class of works of which it is a fair example 'The unicorn,' he writes, "has but one horn in the middle of its forehead. It is the only animal that ventures to attack the elephant, and so sharp is the nail of its foot, that with one blow it rips up the belly of that most terrible of all beasts. The hunters can catch the unicorn only by placing a young virgin in the forest which it haunts. No sooner does this marvelous animal descrie the damsel than it runs toward her, lies down at her feet, and so suffers itself to be taken by the hunters. The unicorn represents our Lord Jesus Christ, who, taking our humanity upon Him in the Virgin's womb, was betrayed by the wicked Jews, and delivered into the hands of Pilate. Its one horn signifies the Gospel truth, that Christ is one with the Father," etc. The source of the mediæval Bestiaries is to be found in the Greek work *Physiologus*, probably written about the second century A.D., at Alexandria. It immediately became very popular, but in 496 was censured by a synod. It was translated into Latin, Ethiopic, Armenian, Syriac, Old English, Icelandic, etc., numerous additions and changes being made. The original number of symbols is 49. Consult F. Lauchert, *Geschichte des Physiologus* (Strassburg, 1890), Nover, *Die Tiersage* (Hamburg, 1893), Zell, *Tierfabeln und andere Irrtümer in der Tierkunde* (2d ed., Stuttgart, 1904), Class, *Auffassung und Darstellung der Tierwelt im französischen Roman de Renart* (Tubingen, 1910), Keller, *Die Antike Tierwelt* (2 vols., Leipzig, 1909-13), Goldstaub and Wendtner, *Ein Tosco-Venezianischer Bestiarus* (Halle, 1892), Goldstaub, *Der Physiologus und seine Weiterbildung, besonders in der lateinischen und in der byzantinischen Literatur* (Leipzig, 1901).

BESTIARI. See GLADIATOR

BESTUZHEV, be-stŭzh'ev, ALEXANDER ALEXANDROVITCH (1797-1837) A Russian novelist and critic. He was captain in a dragoon regiment and adjutant to Alexander, Duke of Württemberg. Having been involved with his friend Ryleev, in the political conspiracy of 1825, he was degraded to the ranks and exiled to Yakutsk, but after long entreaty was permitted to enter the Army of the Caucasus as a private in 1829. He fell in a skirmish with the as yet unconquered mountaineers. He began his literary activity in 1819 and two years later published his first book, *A Trip to Revel*. Two years before his exile he, together with Ryleev, had published the Russian almanac, *The Polar Star*, a very unique literary production which drew about its authors many contemporary writers, including such poets as Pushkin. Bestuzhev's later works, consisting chiefly of novels and sketches, written after 1830 under the pseudonym of "Cossack Malinsky," were based on his experiences in the Caucasus. They excel in depicting the wilder aspects of nature and the excitements of a soldier's life, but fail in the delineation of character, and are often exaggerated and sometimes absurd. Among his principal works are the tale of *Mullah Nur* and the romance of *Ammalat Bek*, which last relates the treachery of a Circassian chief and gives interesting pictures of the scenery of the Caucasus. Bestuzhev was a romanticist like Victor Hugo, whom he greatly admired. In the great literary controversy of the day, "Classicism vs Romanticism," Bestuzhev took a most prominent

part, and even such a critic as Belinsky (qv) acknowledged his great services to Russian literature. Several of his novels were translated into German by Seebach (Leipzig, 1837), and his collected works appeared at St. Petersburg (5 vols., 1835, 3d ed., 12 vols., 1839, and 4th ed., 1847) under the name of *Malinsky's Tales*.

BESTUZHEV-RYUMIN, ryŭm'én, KONSTANTIN NIKOLAYEVICH (1829-97) A Russian historian, born at Kudresh (government of Nizhni Novgorod). He took great interest in literature and history during his gymnasium training, studied law at the University of Moscow, taught school, and in 1856-59 assisted in the editorship of the *Moscow Gazette*. For a time he was editor of the *Moscow Review*, which contained original contributions from his own pen, notably his essays on Russian history, but he soon moved to St. Petersburg and became a regular contributor to the *Annals of the Fatherland*. In 1863-64 he edited the *Journal of the Geographical Society*, from 1865 to 1882 occupied the chair of Russian history at the University of St. Petersburg, and from 1878 to 1882 was president of the Slave Benevolent Society, while also editing its official reports and papers. The Imperial Academy of Science elected him to membership in 1890. He contributed numerous articles to periodicals, helped to edit Kravetsky's *Encyclopædic Dictionary*, and translated (with Tikhin) Buckle's *History of Civilization*. His original work includes *The Christianization of Russia* (1864), *The Black Days of Tatarism* (1864), and several other books and numerous monographs. Of considerable literary note is his collection of essays published in 1882 under the title *Biographies and Characteristics*, but by far his most important work is his *Russian History*, of which but two volumes were completed (vol. 1, 1872, vol. 11, 1885), and which gives a good general view of the leading factors in Russian history to the close of the reign of Ivan the Terrible, treated in a most scholarly and impartial manner.

BETANZOS, bá-tan'thós (anciently, *Bragantium Flavum*) A city of Spain, in the province of Coruña, 11 miles east-southeast of the city of the same name (Map Spain, A 1). It contains remains of a Moorish castle and ancient granite gateways. The town manufactures linen, leather, and earthenware, and carries on a trade in wine and grain. Betanzos is one of the oldest towns of Galicia, and early in its history formed a city or republic with Coruña, which was its port. Henry IV, in 1465, made it a city in its own right. Pop., 1900, 9948, 1910, 8826.

BETA RAYS, bê'tá, or bá'tá, rāz See RADIUM

BETEL, or **BETLE** (Sp., Portug. from Tamil *vettile*, betel, literally, a mere leaf), or **PAWN** A narcotic stimulant, much used in the East and particularly by all the tribes of the Malay race. It consists of a leaf of one or other of certain species of pepper, to which the name of betel pepper is indiscriminately applied, plucked green, spread over with moistened quicklime (*chunam*), generally procured by calcination of shells, and wrapped around a few scrapings of the areca nut (see ARECA), sometimes called the betel nut, and also known as *pinang*. This is put into the mouth and chewed. It causes giddiness in persons unaccustomed to it, excoriates the mouth, and deadens for a time the sense

of taste. It is so acrid that Europeans do not readily become habituated to it, but its consumption in the East Indies is prodigious. Men and women, young and old, indulge in it from morning to night. The use of it is so general as to have become a matter of etiquette, the Malays rarely go out without their betel boxes, which they present to one another as Europeans did at one time their snuffboxes. The chewing of betel is a practice of great antiquity and can certainly be traced back to at least the fifth century B.C. It gives a red color to the saliva, so that the lips and teeth appear covered with blood, the lips and teeth are also blackened by its habitual use, and the teeth are destroyed, so that men of 25 are often toothless. Whether the use of betel has any advantages except the mere pleasure afforded to its habitues, to counterbalance its obvious disadvantages, is a question upon which difference of opinion exists. By some it is believed to promote the secretion of saliva, strengthen the digestive powers, and ward off attacks of fever, others condemn it unqualifiedly. Sir James Emerson Tennent, in his work on Ceylon, expresses the opinion that it is advantageous to a people of whose ordinary food flesh forms no part, and that it is at once the antacid, the tonic, and the carminative which they require.

The name "betel" is often given to the species of pepper of which the leaves are chewed in the manner just described, which are also called betel pepper or pawn. Some of them are extensively cultivated, particularly *Chavica betle*, *Chavica snaboa*, and *Chavica malamu*, climbing shrubs with leathery leaves, heart-shaped in the first and second of these species, and oblong in the third. They are trained to poles, trellises, or the stems of palms, and require much heat with moisture and shade, in the north of India, where the climate is unsuitable, they are cultivated with great attention in low sheds, poles being placed for their support a few feet apart. The genus *Chavica* is one of those into which the old genus *Piper* (see PEPPER) has been divided. The requisite qualities of betel are probably found in the leaves of numerous species not only of this but of other genera of the same family. The leaf of the ava (q v) is sometimes used.

BETEL NUT See ARECA, Plate of ANEMONES, ETC.

BETERRAE See BEZIERES

BETERRA SEPTIMANORUM. See BEZIERES

BETH (Heb house) A word frequently introduced as an element in the name of places, as Beth-el, house of God, Beth Shemesh, house of Shemesh, the sun god, Beth Anath, house of Anath, the goddess, Beth Lehem, house of the god Lehem, etc. The corresponding word in Arabic, which is similarly used, is *Beit* (q v).

BETHABARA See BETHIANY

BETHAM-EDWARDS, MARILDA (1836-) An English novelist and writer (particularly on French rural life), who was born at Westerfield in Suffolk. Her mother was the little Barbara Betham, to whom Mary Lamb penned "as charming a letter as was ever addressed to a child." Miss Edwards received her education, which was purely literary, at home and by foreign travel, especially in France. She became *Officier de l'instruction publique de France* in 1891. Her literary career as a poet began with the contribution to *Household*

Words, then edited by Charles Dickens, of a poem called "The Golden Bee," for which she received only a sovereign (\$5). The poem was republished in a volume of poems (ballads) in 1855 and again in 1885. At the age of 19 she published her first novel, *The White House by the Sea* (1855), and thenceforth devoted herself to literature, contributing to the leading magazines. Her publications include novels, poems, and miscellaneous works on travel and literature. Her novels are *John and I* (1862), *Dr Jacob* (1864), *Kitty* (1869), *The Parting of the Ways* (1888), *A Romance of Dyon*, *The Lord of the Harvest*, *A Suffolk Courtship* (1900), *Mock-Beggar's Hall* (1901), *Barham Broodleban*, M.D. (1904). Her poems are *The Golden Bee* (1907). Among her miscellaneous works are an edition of *Arthur Young's Travels in France*, *Sea Life-Studies of Famous Women* (1880), *France of To-Day*, *Anglo-French Reminiscences* (1890)—all of which are very entertaining, *East of Paris* (1902), *Home Life in France* (1905), *Literary Rambles in France* (1907), *French Men, Women, and Books* (1910).

BETH'ANY (Gk Βηθάνια, *Bethania*, of uncertain Aramaic etymology, the Talmud giving it as *beth*, house + *anech*, or *hine*, dates) 1. A village on the Mount of Olives, about 1½ miles from Jerusalem, on the road to Jericho, frequently referred to in the Gospels (Map Palestine, C 4), to be identified with the modern El-Azariyeh (= 'from Lazarius'). It was the home of Lazarius and his sisters, where Jesus was always a welcome guest (John x 1 with Luke x 38-42). Here also was the house of Simon the leper, where Jesus was entertained on his arrival at the village on the evening previous to his public entry into Jerusalem (Mark xiv 3 with John xii 1, 2). It was "over against Bethany" that the ascension took place (Luke xxiv 50). Under the ruins of a convent built in 1180 A.D. is the traditional grave of Lazarius, and the popularly supposed house of Martha and Mary is pointed out in the village. 2. According to the best manuscripts (followed in the Revised Version), the name of the place where John the Baptist was baptizing at the beginning of his ministry (John i 28). It is called in some manuscripts and in the Authorized Version Bethabara. The site is not certainly known. Some have supposed it to be the same as Beth-Nimrah, some 1½ miles east of the Jordan from Jericho, identified with the modern Nimrin, others locate it much farther up the valley.

BETHANY A city and the county seat of Harrison Co., Mo., about 65 miles northeast of St. Joseph, on the Chicago, Burlington, and Quincy Railroad (Map Missouri, B 1). It is the centre of an agricultural and stock-raising region, in which also building stone is quarried, and contains flouring mills, canning factories, brickyards, etc. The Neilborn Sanitarium is a noteworthy feature. The electric light plant is owned by the city. Pop., 1890, 1105; 1900, 2093; 1910, 1931.

BETHANY A borough in Brooke Co., W. Va., 16 miles northeast of Wheeling. It is the seat of Bethany College, an institution founded by Alexander Campbell (q v) in 1841, and under the control of the Disciples of Christ. Bethany Mansion, the homestead of Alexander Campbell, is in Bethany. Pop., 1900, 245; 1910, 433.

BETHANY COLLEGE A coeducational

institution at Lindsborg, Kans, under the auspices of the Swedish Lutheran church, founded in 1881. It has preparatory, normal, commercial, collegiate, model school, art, and music departments, with 45 instructors and a student body of about 300, a library of 9000 volumes, and an endowment in 1913 of \$65,732. President, Ernst F. Pihlblad.

BETH'EL (Heb house of God, from *beth*, house + *el*, God). A town of Palestine, the modern Betin, situated in the mountains at a height of 2880 feet above the sea level, 10 miles north of Jerusalem. It is associated with the early traditions and legends of the Hebrews. Abraham pitches his tent near Bethel, builds an altar, and worships there (Gen. xii 8, xiii 3), but it is Jacob who is more particularly associated with the place and to whom the giving of its name is assigned. According to Gen. xxviii, God appears to Jacob at Bethel on his flight to Haran, in Gen. xxxv 3, it is on the return of Jacob from Padan-Aram that he encounters God. The former passage contains the story of Jacob's vision, in which he sees angels ascending and descending a "ladder"—possibly conceived of as a structure like a Babylonian *zikkurat*, or temple tower, with a sloping ascent winding around to the top, with God standing at Jacob's side and repeating the promise made to Abraham. Gen. xxxv lays more emphasis upon the change of Jacob's name to Israel than upon the name Beth-el given to the place because God "spoke" with Jacob there, while according to Gen. xxviii the giving of the name follows Jacob's exclamation, "This is none other than the house of God," i. e., Beth (house) El (God). These traditions bear witness to the antiquity of the sanctuary at Bethel. In later times those ancient sanctuaries are regarded as idolatrous. So Jeroboam is rebuked for erecting a sanctuary at Beth-el (1 Kings xii 29), Hosea going so far as to call the place Beth-aven, 'house of iniquity' (Hos. iv 15). Its earlier name is said to have been Luz (Gen. xxxviii 19, xxxv 6, xlviii 3, Josh. xviii 13, etc.), once (Josh. xvi 2) a distinction is made between Bethel and Luz, according to the received Hebrew text, but some for "Bethel" here read "Bathaveh".

A king of Bethel is mentioned (Josh. xii 9, 16), which may be taken as an indication of the importance of the place. As a frontier town it is sometimes reckoned as belonging to the tribe of Benjamin (Josh. xviii 22), sometimes to Ephraim (Judg. i 22). During the period of the Judges Bethel was, in fact, the central sanctuary of the northern tribes, where the ark was stationed (Judg. xx 18), and when the division of the tribes came, Bethel rose to even greater significance in the Kingdom of Israel, having an elaborate organization of priests and prophets (Amos vii), to which the masses were drawn by the feasts and rites, arranged with great splendor. The worship of Yahweh at Bethel proved a serious rival for a long period to that at Jerusalem and hindered the religious concentration at the latter place until the downfall of the northern kingdom. Josephus (*B. J.* iv, 9) states that Vespasian in 69 A. D. garrisoned Bethel before he went on to Jerusalem. Consult G. A. Smith, *History and Geography of the Holy Land*, pp. 289 ff. (1894).

BETHEL. A town in Oxford Co., Me., 70 miles north-northwest of Portland, on the Grand Trunk Railway and on the Androscoggin River (Map Maine, B 4). It is a summer resort,

noted for its attractive scenery. The town has manufactures of canned goods, chairs, lumber, spools and bobbins, etc., and contains Gould's Academy and several small libraries. Pop., 1900, 1835, 1910, 1930. Consult Lapham, *History of Bethel, 1768-1890* (Augusta, 1891).

BETHELL, RICHARD, first Lord WESTBURY (1800-73). An eminent English judge. He was born at Bradford-on-Avon, Wilts., of a Welsh family of distinction, and was educated at the Bristol Grammar School and at Wadham College, Oxford, where he was entered at the early age of 14. He took his B.A. degree in 1818 and continued for several years in residence as a successful tutor. He then entered the Middle Temple and was called to the bar in 1823. He soon attained prominence as a practitioner in Chancery and in 1840 was made Queen's counsel. His public career may be said to have commenced with his appointment as Vice Chancellor of the Duchy of Lancaster in 1850. From 1852 to his elevation to the House of Lords in 1861 he was a member of the House of Commons. He was a strong supporter of the Liberal party and, on the formation of the Aberdeen ministry in December, 1852, was knighted and appointed to the post of Solicitor-General. In 1856 he became Attorney-General, retiring with the defeat of the government in February, 1858, and being again appointed in its return to power in June, 1860. On June 26, 1861, he succeeded to the office of Lord Chancellor as Lord Westbury. As Chancellor he was celebrated for his learning, acumen, and the soundness of his judgments, and for his power of lucid exposition, which gave him a high place in the list of distinguished men who have held the Great Seal, but his administration of his high office was clouded by charges of corruption which were made the subject of a parliamentary investigation. Though he was acquitted of the accusation of personal corruption, he was nevertheless censured for the laxity of principle and disregard of the public welfare that he had exhibited, and as a consequence he resigned his office in 1865 and retired to private life. But his mind was too active and his interest in public affairs too keen to permit him to remain long in retirement, and he was soon back in his place as a member of the House of Lords and of the judicial committee of the Privy Council.

The last years of his life were perhaps the most active and useful of his whole career. His strong common sense and the penetrating character of his mind, as well as his contempt for stupidity and inefficiency, made him an indefatigable advocate of law reform. Among the many important improvements in legal administration effected by him were the acts which deprived the ecclesiastical courts of the jurisdiction exercised by them in matrimonial and probate causes, the revision and consolidation of the statute law of the kingdom, and a measure for the registration of titles to land. He was also a zealous advocate of codification, and throughout his career fought against the undue reverence for precedent which distinguished the judges of his time.

While still at the bar he was instrumental in the work of improving the methods of legal education, and it was mainly through his efforts that the Inns of Court (*q. v.*) were roused to a sense of their responsibility in the matter. Consult, for an estimate of his judgments as Lord Chancellor, Campbell Smith's *Writings by the*

Way and *The Dictionary of National Biography* (London, 1885)

BETHESDA A pool of water at Jerusalem, where Jesus is said to have cured the man who had waited 38 years to be led into the "troubled water" (John v 2). The name is uncertain, different manuscripts and translations giving Bethesda, Bethzatha, and Bethsaida, and it has been suggested that it originally read Bethzatha, 'place of olives'. Bethesda may have signified 'place of the stream'. It is said to have been 'by the *Probatica*,' which may represent either 'Sheep Gate,' or 'Sheep-Pool,' or 'Baths.' Tradition varies as to its site, the most probable location being the Twin Pools of St Anne's north of the temple area, or the Virgin's Pool. If a natural cause is sought for the phenomenon, the best explanation would perhaps be to identify Bethesda with the Virgin's Pool, the only natural spring in Jerusalem. It is situated on the Ophel slope, southeast of the temple. A cavern below forms a natural siphon, so that the water overflows at definite periods, when people still bathe in the water, because they believe it will cure their diseases. The fact that sheep were watered at this place may have given rise to the name "Sheep-Gate," if that is the meaning of *Probatica*. Otherwise this gate was situated north of the temple. And much may be said in favor of the site near St Anne's, where excavations of the White Friars have disclosed a large vaulted cistern which the Crusaders supposed to be the Pool of Bethesda and over which they built a church. Consult G. A. Smith, *Jerusalem*, pp 564 ff. (1908), and L. Paton, *Jerusalem*, pp 41 ff. (1908).

BETH-HORON (Heb. place of caves). Two villages of Palestine, 9 to 12 miles from Jerusalem, called, respectively, the Upper and Lower Beth-Horon. A late statement, but of no value, ascribes the founding of the place to Sheelah, daughter of Ephraim (1 Chron vii 24). The importance of Beth-Horon is due to its position on one of the most accessible passes leading from the valley of Ajalon to Jerusalem. The Lower Beth-Horon stands on a ridge about 1240 feet above the sea level, the Upper, which is about an hour's climb from the Lower, stands on a mountain spur 1730 feet above the sea. When Joshua defeated the five kings of the Amorites at Gibeon, the road of pursuit passed by Beth-Horon (Josh x 11). In later times the place was often fortified, and Judas Macabaeus here defeated the Syrian Prince Seion (1 Macc iii 13-24, vii 39-40). The present villages are still known as "Upper" and "Lower" Beit-ur.

BETHLEHEM (Gk. *Βηθλεὲμ*, *Bēthleēm*, from Heb. *bēth*, house + *lehem*, bread. 1. The present *Beit Lahm*, a town located on a limestone ridge, some 2550 feet above sea level, about 5 miles southwest of Jerusalem, and about three-fourths of a mile east of the main road to Hebron (Map Palestine, C 4). It was called at times *Bethlehem-Judah* (Judg vii 7 ff., xiv 1 ff., Ruth i 1 f., 1 Sam xvii 12, cf. Matt ii 1, 5 f.), to distinguish it from the similarly named place in Zebulun. The name is significant of the fertility of the valleys near by, which abound in grain fields, olive and fig orchards, and vineyards, though strangely lacking in springs of water. Bethlehem, anciently included in the district Ephraim, became famous in olden times as the birthplace and early home of King David

(1 Sam xvii 12, 15, 58). It was not a place of great importance, though connected with not a little of Old Testament history (cf. Gen xxv 19, xlviii 7, Ruth i 19, etc., 2 Sam ii 32, xxiii 34, 2 Chron xi 6, Jer xli 17, Ezra ii 21). Its special distinction arose from its prophetic designation as the home of the coming Messiah (Micah v 2), in fulfillment of which prediction it appears in the Matthew narrative as the birthplace of Jesus (ii 1-18). As such, it was venerated by Christians as early as the second century. For this reason, probably, Hadrian laid it waste in 132. Constantine the Great, in his zeal for Christianity, revived the place by building there a large basilica, the church of St Mary, near the supposed site of Jesus' birth (c. 330). Since then, Bethlehem has been one of the great pilgrim shrines of Palestine. Its present population is about 8000, mostly Christian, as the Mussulman quarter was destroyed by Ibrahim Pasha after the insurrection of 1834.

The centre of interest in Bethlehem is the famous basilica of Constantine, one of the oldest Christian edifices in the world. The Gospel of Luke states that the infant Saviour was laid in a manger, which is supported by the early tradition that He was born in a cave (cf. *Protev. James*, 18, 19, 21, and Justin Martyr, *Dial. c. Tryph.*, ed. Otto, § 78), and by the ancient custom of using the limestone caves of the hill country of Judaea as shelters for cattle. Justinian (527-565) enlarged Constantine's church, so that the transept covered the supposed Cave of the Nativity. Other crypts under the building are now connected with scenes of the Infancy. Here, also, are the chapel and grave of Jerome, who wrote the Vulgate in a grotto near by. The church was highly esteemed by the Crusaders, who, after its capture in the eleventh century, made it an episcopal see. In 1101 Baldwin was crowned in it. In 1170 the Emperor Manuel Comnenus decorated its walls with mosaics. In 1482 Edward IV and Philip of Burgundy contributed the materials for repairing the roof. At present, Greek, Roman Catholic, and Armenian monastic establishments enclose the church on the two sides and the rear. 2. A small village in Zebulun (Josh xix 15), 7 miles northwest of Nazareth, the modern insignificant *Beit Lahm*, the home and burial place of Ibsan, one of the judges of Israel (Judg. xii. 8, 10). Consult Sanday, *Sacred Sites of the Gospels* (1903), Ramsay, *Was Christ Born in Bethlehem?* (1898), Dory, *Bethleēm, ses sanctuaires, ses habitants, et leurs usages* (Brussels, 1901), Weigand, *Die Geburtskirche von Bethlehem* (Leipzig, 1911).

BETHLEHEM A borough in Northampton and Lehigh counties, Pa., 56 miles north of Philadelphia, on the Lehigh River and Canal, and on the Central of New Jersey, the Lehigh Valley, the Lehigh and New England, and the Philadelphia and Reading railroads (Map Pennsylvania, L 5). Among the more prominent features are two bridges, one about 700 feet long, and the other 1100 feet long, connecting with South Bethlehem (q.v.), the Church of the Nativity, a public library, and St Luke's Hospital. The manufacturing interests comprise extensive iron and steel works, zinc and graphite works, silk and knitting mills, hosiery and paint factories, etc. Bethlehem is governed under a charter of 1851, which provides for a burgess, elected every four years, and a borough council

The water works are owned and operated by the municipality. Pop., 1900, 7293; 1910, 12,837. In 1904 West Bethlehem, with a population (1900) of 3465, was consolidated with Bethlehem. Bethlehem was founded by the Moravians (q v) in 1742 and soon became the headquarters in America of that sect, which maintains here a college and theological seminary, parochial schools, and a seminary and college for women. In 1778-79 the general hospital of the Continental Army was situated here, and in West Bethlehem 500 soldiers were buried. Bethlehem was incorporated in 1845. Consult An article by Jordan, "Bethlehem during the Revolution," in *Pennsylvania Magazine of History and Biography*, vol. xiii (Philadelphia, 1890). Levering, *History of Bethlehem* (Bethlehem, 1903).

BETHLEHEM, MUSICAL OR BACH FESTIVAL Musically, Bethlehem, Pa., is the most remarkable town or settlement in the United States. To a great degree it is a Moravian town, having been founded by the Moravians about 1740 and being still under the influence of the policy then inaugurated. In 1780 the settlement had an orchestra, probably the first in America, which fact, together with the strong musical tendency of the liturgy of the Moravian church, with its realistically religious hymns, undoubtedly led up to the developments of the present day. Early in its church history flutes, horns, violas, and trombones were permanent factors in the church music. The modern festival is frequently referred to as the American musical Oberammergau, or the American Bayreuth. It resembles the latter in many ways and particularly in the employment of a quartet of trombones to summon the people to the performances, as do the trumpets in the German town. Its resemblance to Oberammergau is in the essentially religious character of the festival, the permeating Protestant sentiment of which is admirably expressed in the music of Bach. The festival of 1901 was remarkable for the first performance in America of Bach's *Christmas Oratorio* in its entirety. Besides this great work were given the *Passion* according to St. Matthew and the *Mass in B Minor*, the latter having been presented for the first time in America two years before. J. Frederick Wollé, a pupil of Rheinberger, and the organist of the Moravian church, has charge of the music. The choir consists of 110 members, with a separate chorus of 100 boys, for the chorals, and an orchestra of 60 instrumentalists. When Mr. Wollé in 1906 removed to California, the Bethlehem festivals were discontinued. Mr. Wollé, however, gave annual Bach festivals of the same character at Berkeley, Cal. After his return to Bethlehem in 1912 the annual Bethlehem festivals were immediately reestablished.

BETHLEHEMITES, or BETHLEHEMITE BROTHERS. 1. An order of monks mentioned by Matthew of Paris as being at Cambridge, England, in 1257, and as wearing a red star with five points and a blue disk in the middle on their breasts, in allusion to the Star of Bethlehem, but otherwise being in dress Dominicans. Nothing more is known of them. 2. An order founded in Guatemala by Pedro de Betancourt (1619-67), which grew out of a congregation he collected living under the rule of the Third Order of St. Francis, and caring especially for the sick and educating children. Its constitution was approved by the Pope in 1672, and the congregation was expanded into an order in 1687 and put under the rule of

the Augustinians. They dressed similarly to the Capuchins and carried on their right breast a shield with a representation of the manger at Bethlehem and near it Mary and Joseph. They were specially bound to exercise hospitality and to tend the sick, even though they had infectious diseases. In 1668 a female order of the name was founded in Guatemala, but it never spread. The male order spread in South America, but in 1820 was secularized and in 1845 was extinct. 3. The followers of John Huss were styled Bethlehemites, from the Bethlehem Church in Prague, where their leader preached.

BETHLEM. See BEDLAM.

BETHLEN-GÁBOR, bét'lén gá'bór, or GABRIEL BETILEN, or BETHLEHEM (1580-1629) Prince of Transylvania, 1613-29. He was a member of a prominent Protestant family of upper Hungary, which possessed, also, important estates in Transylvania. In 1613, with the assistance of the Sultan, and in defiance of the Emperor, he was made ruler of Transylvania. In 1619 he took advantage of the Bohemian struggle, and openly took up arms against Austria. He overran Hungary, took Presburg, and spread devastation and terror to the gates of Vienna. The enthusiastic Hungarians elected him King (1620). His allies, the Protestants of Germany, having been crushed in the battle of Prague, Bethlen-Gábor concluded peace with the Emperor Ferdinand II, receiving the town of Kaschau, with seven Hungarian counties adjoining Transylvania, the principalities of Oppeln and Ratibor in Silesia, and the dignity of Prince of the Empire. In 1623 Bethlen-Gábor renewed the war and, raising an army of 60,000 men, invaded Moravia, and obtained the solemn renewal of the former treaty. His marriage with Catharine of Brandenburg in 1625 involved him once more in the Thirty Years' War, but he finally retired from the contest in the following year, and thenceforth devoted himself exclusively to the internal affairs of Transylvania. He died in 1629, after a lingering and painful illness. He was known as one of the "three great Magyars" of his age. Bethlen-Gábor was an able administrator as well as a brilliant general, and his reign was as beneficial to Transylvania on the side of internal progress as it was glorious for its military exploits. He encouraged the sciences and letters and promoted education. His brother STEPHEN succeeded him, but was soon compelled to resign the throne. To the same family of Bethlen belong JOHN and WOLFGANG, both chancellors of Transylvania, the former of whom is celebrated for his work, *Reserum Transylvanicarum Libri IV* (Hermannstadt, 1683), which gives the history of the principality from 1629 to 1663, and the latter of whom wrote a history in 16 books, the manuscript of which, from long neglect, had been much damaged, but which was afterward restored and completed and published (6 vols.) at Hermannstadt in 1792, under the title of *Wolfgangi de Bethlen Historia de Rebus Transylvanicis, 1526-1609*.

BETHMANN-HOLLWEG, bät'man höl'vák, MORITZ AUGUST VON (1795-1877). A German jurist and statesman, born at Frankfurt-on-the-Main. He studied law at Göttingen and Berlin and became professor of civil law at Berlin. He held a similar chair at Bonn from 1829 to 1842 and in 1845 was appointed a counselor of state. From 1849 to 1852 he was a member of the

First Chamber of the Prussian Parliament, and from 1852 to 1855 a member of the Second Chamber. He was Minister of Public Instruction from 1858 to 1862, and was a supporter of the Moderate Constitutional party. His juristic writings are highly esteemed and did much to prepare the way for the sweeping reform of the German law which culminated in the enactment of the German Civil Code in 1896. He published *Grundriss zu Vorlesungen über den gemeinen und preussischen Civilprozess* (1821, 2d ed. 1832); *Ursprung der lombardischen Stgdtfreiheit* (1846); *Der Civilprozess des gemeinen Rechts in geschichtlicher Entwicklung* (6 vols, 1864-74); *Ueber Gesetzgebung und Rechtswissenschaft als Aufgabe unserer Zeit* (1876).

BETHMANN-HOLLWEG, THEOBALD THEODOR FREDERIC ALFRED VON (1850-) A German statesman, born in Hohenflinow, province of Brandenburg, Germany. He was educated at the College of Pforta and at the universities of Strassburg, Leipzig, and Berlin. In 1879 he entered the civil service and in 1885 was appointed Landrat of Oberbarnum, Brandenburg. Thereafter he served, in succession, as provincial President of Potsdam, President of the government of Bromberg, and President of the province of Brandenburg in 1901. While Minister of the Interior (appointed 1905) he also occupied the post of Vice Chancellor of the Empire under Prince von Bulow. In 1907 he was appointed Imperial Secretary of State for the Interior, and Vice President of the Prussian Council, and on July 14, 1909, Chancellor of the German Empire, Prussian President of the Council, and Minister of State for Foreign Affairs, to succeed Prince von Bulow. For the circumstances of his appointment and the more important events in his administration, see *GERMANY, History*. Bethmann-Hollweg showed himself a mild Conservative in politics, but as a minister of the crown he was non-partisan. From early manhood he was a friend and adviser of the Emperor William.

BETH'NAL GREEN A metropolitan borough of Greater London. See London.

BETH-PE'OR (Heb house or dwelling of Peor, i.e., the god of Baal-Peor) A city belonging to Reuben, opposite a ravine, in which Israel is said to have received the Deuteronomic laws (Deut. ii 29), and the locality in which Moses is supposed to have been buried. The exact place cannot be identified, but that it was somewhere in the Nebo-Pisgah Mountains seems certain. If it is on the southern side of Wady Ayun Musa, as some geographers hold, the "ravine" would be Wady Hesban. Ain el-Muneh, on the northern side of the mountain ridge, has also been suggested as a possible location of the city, which has an extended view over the Plain of Shittim. The former, however, would be more accessible from the plain.

BETH-PHAGE (Gk Βηθφαγή, *Bethphage*, from Heb *beth*, house + *pag*, untrodden figs) A village situated on the Mount of Olives, on the road from Jerusalem to Jericho, a short distance from Bethany. It was to this place that Jesus sent his disciples to bring the ass on which he rode in his entry into the city (Matt. xxi 1). The site is identified by tradition with *Abu Dis*.

BETHSA'IDA (Gk Βηθσαϊδά, *Bethsaida*, a name of Syriac etymology—a place of fishing) The name of a place frequently mentioned in the Gospels. It was a Jewish town located on the

north shore of the Sea of Galilee, a little east of where the Jordan enters and near the newer Greek city, which was some distance farther back from the shore and had been built by Herod Philip, by whom it was advanced to the rank of a city and named Julius, in honor of Julia, the daughter of Augustus (Josephus, *Wars*, iii, 10, 7, also *Ant.* viii, 2, 1). It is to distinguish the Jewish from the Greek city that John refers to the home of Philip, the disciple, as "Bethsaida of Galilee" (xvi 21).

It was near this older (Jewish) Bethsaida, which was the home of three of his disciples (John i 41), that Jesus fed the 5000 (Mark vi 31-45, Luke ix 10-17), it was this place that he denounced for its unacceptivity to his ministry (Matt. xi 21, Luke x 13), and it was outside its walls that he took the blind man to heal him of his infirmity (Mark viii 22, 23). There is no certain evidence of the existence of another city of this name on the western side of the lake, to which many have thought Mark vi 45 might refer (Consult Sanday, *Sacred Sites of the Gospels*, p. 48). As to the later history of Bethsaida Julius, nothing is known beyond the fact that it was given by Nero to Agrippa II (Josephus, *Ant.* xx, 8, 4, *Wars* ii, 13, 2).

BETH-SHE'MESH (Heb house of the sun, or the sun god) The name given to several places in the Old Testament, the most important of which was a town situated in Judah given to the Levites (Josh. xxi 16), though subsequently included in the territory of Naphtali (Josh. xix 38). It corresponds to the modern Ain Shems, about 15 miles southwest of Jerusalem, finely situated on the point of a low ridge, commanding an extensive view of the country. It is interesting as the place where the Ark first rested after the Philistines had sent it back (1 Sam. vi 9). According to 1 Sam. vi 19, 50,000 men of this city were slain by Yahwe because "they had looked into the ark of Yahwe." One of Solomon's 12 purveyors resided at Beth-shemesh (1 Kings iv 9), and here was fought the battle between Judah and Israel, in which Jehoash captured Amaziah (2 Kings xiv 11-13, 2 Chron. xxv 21-23). Beth-shemesh was taken by the Philistines during the reign of Ahaz (2 Chron. xxviii 18) and from that time disappears from history. The name indicates that it was a centre of sun worship. In Jeremiah (xlii 13) there is an interesting reference to the "pillars of Beth-shemesh, that is in the land of Egypt," which, as the Greek translation shows, rendering "the pillars of Heliopolis that are at On," is intended for On in Lower Egypt. The pillars refer to the obelisks associated with the worship of Re, the Egyptian sun god.

BETHUNE, ba'tun' A town in the department of Pas-de-Calais, France, built on a rock overlooking the river Brette, and the canals of Laws and Aire, 16 miles north-northwest of Arras (Map France, N. H. 2). It is strongly fortified, the works having been begun by Vauban, who made it one of the strong places of Artois. Its principal public buildings are the Gothic church of St. Vaast, two hospitals, and a communal college. Bethune lies in the richest coal-mining section of France, and its industries are the distillation of oil, salt refining, the manufacture of earthenware, casks, linen, and cloth, and trade in flax, cloth, cereals, and agricultural products. Pop., 1901, 11,370, 1911, 15,309.

BETHUNE, be-thoon', CHARLES JAMES STEWART (1839—) A Canadian clergyman and entomologist. He was born at West Flamboro, Ontario, and studied at Trinity College, Toronto. In 1870 he was appointed head master of Trinity College School. He was founder of the Ontario Entomological Society and the first editor of *The Canadian Entomologist*, the editorship of which he resumed in 1886. He was professor of entomology and zoology in the Ontario Agricultural College from 1906 to 1910. His publications include *Description of some Species of Nocturnal Lepidoptera Found in Canada* (2 vols., 1863-65), *Bibliography of Canadian Entomology for the Year 1900* (1901).

BETHUNE, DAVID. See BLATON, DAVID.
BETHUNE, GEORGE WASHINGTON, D.D. (1805-62). An American clergyman, born in New York and educated at Dickinson College and Princeton Theological Seminary. In 1828 he became pastor of a Dutch Reformed church at Rhinehart, then at Utica, N. Y., and in 1834 in Philadelphia. In 1848 he took charge of a new congregation in Brooklyn, N. Y., 11 years later visited Italy to improve his health, and in 1861 again went to Italy, where he died suddenly from apoplexy. He was an eloquent preacher, accomplished scholar, fisherman, wit, and poet. He published *Lays of Love and Faith* (Philadelphia, 1847), *Orations and Discourses* (1850), *Memoirs of Joanna Bethune* (1864). He edited *Walton's Complete Angler* (London, 1847) and *The British Female Poets* (Philadelphia, 1848). For biography, consult A. R. Van Nest (New York, 1867).

BETHUNE, MAXIMILIAN DE, DUKE DE SULLY. See SULLY.

BETHUNE, THOMAS G. See BLIND TOM.

BETTEL. See BETEL.

BETO'YAN. An important and extensive South American Indian linguistic stock, occupying parts of eastern and southern Colombia and the adjacent regions of Venezuela and Brazil, its tribes being found, now or formerly, on the rivers Japurá, Içá, Uaupes, Negro, Casanare, Apaporis, Tiquié, Caíari, etc., scattered over the country between 3° S. lat. and 7° N. lat. and between 67° and 73° W. long. Among the numerous tribes of this stock the most important are the Kobeyas, Tükanos, Kuretiás Yúpías, Betóyas, Correguages, Piojes, Tamas, etc. Many of the Betoyan tribes are quite primitive, but some have taken up agriculture more or less, others are excellent canoeemen, etc. The Betoyan peoples and their languages have been studied most recently by Rivet and Koch-Grünberg. For details, see Koch-Grünberg, *Zwei Jahre unter den Indianern. Reisen in Nordwest-Brasilien 1903-1905* (Berlin, 1910), and H. Beuchat and R. Rivet, "La famille Betoya ou Tucano," in the *Mémoires de la Société de Linguistique de Paris*, vol. xvii (1911).

BETROTH'AL (from *toth*, a variant of *truth*), or **BETROTH'MENT**. The mutual plighting, or pledging, of *troth*. In modern English and American law, an engagement entered into by a man and woman for their future marriage (qv). This may be, and usually is, a private and informal transaction, constituting a contract obligatory on both the parties, and affording the usual remedy of an action for damages for its breach. See BREACH OF PROMISE, under BREACH. The consideration for the contract is the mutual promises of the parties, and either party may call upon the other to fulfill

the engagement by marriage at the time agreed upon, or, if no date be fixed, then within a reasonable time. In the Middle Ages, however, the betrothal was an important, if not an essential, part of the marriage transaction. It was usually of a ceremonial character, and numerous but ineffectual attempts were made by the Church and the State to compel its celebration with religious ceremonies. Indeed, at one time in the history of medieval society no contract or engagement of marriage, whether present or future, was deemed to be consummated without the subsequent physical union of the contracting parties. Subsequently, however, a distinction was made between a betrothal (*sponsalia per verba de presenti*, which constituted an irregular but valid marriage, though entered into without the sanction of the Church, and *sponsalia per verba de futuro*, which became a marriage, without further words or ceremony, upon its consummation by sexual intercourse. The former has become the so-called common-law marriage, or, where attended with the sanction of the secular or religious authorities, the ceremonial marriage of our own time. The latter, without the physical consummation (which has lost its legal effect), is the betrothal, or marriage engagement, of to-day. It was because Anne Boleyn's previous betrothal to the Earl of Northumberland, though never consummated, was *per verba de presenti*, and therefore something more than a broken engagement, that Henry VIII. was enabled to secure the cancellation of his own marriage to her. The present state of the law on the subject is expressed in the familiar maxim, *Consensus, non concubitus, facit nuptias*—"It is the agreement and not the cohabitation that makes the marriage." Consult Pollock and Matland, *History of English Law* (2d ed., London and Boston, 1899), and the authorities referred to under the title MARRIAGE.

BETROT'ED, bê-trôth', THE. 1. A novel by Scott (1825). 2. A novel by Manzoni (1825-27). 3. An opera by Petrella, produced in 1869, at Lecco.

BETSIMISARAKA, bêt-sé'mé-sa-ra'ka. The mixed Polynesian people of Madagascar living on the eastern side of the island.

BET'SY AND I ARE OUT. A popular poem by Will Carleton (1872), first published in the *Toledo Blade*, and followed by *Betsy and I Made Up*.

BETTELHEIM, bê't'l'-hm, ANTON (1851—) An Austrian author, born in Vienna and educated in that city and in Munich. He published an excellent biographical work on *Beaumarchais* (1886, 2d ed., 1911), and subsequently devoted himself almost exclusively to biographical writing, editing the collection *Führende Geister*, to which he contributed the notable biography of Anzenberger (1891, 2d ed., 1897). He was editor of the *Allgemeine Deutsche Biographie* from 1907 to 1909. Among his later works are *Deutsche Geistesheiden* (1895), *Biographisches Jahrbuch und Deutscher Nekrolog*, vols. 1, 11, and 11 (1898-1900), suspended till 1904 and then resumed, *Louise von François und Conrad F. Meyer* (1905), *Auerbach* (1907), *Prince Hohenlohe* (1910).

BET'TERTON, THOMAS (1635-1710). An English actor. He was born in Westminster and apprenticed by his father to a bookseller, by whose formation of a theatrical troupe Betterton seems to have been introduced to his profession. In 1661 he became a member of Sir William

Davenant's company at the Lincoln's Inn Fields Theatre and quickly became a favorite. The best contemporary judges, such as Steele, Cibber, Pepys, Pope, etc., bear admiring witness to the dramatic power of his impersonations, which overcame the natural disadvantages of a low voice, small eyes, and an ungainly figure. The range of his repertory was wide, including many of Shakespeare's plays and a great variety of contemporary pieces. His Hamlet, to which Miss Sanderson, his future wife, played Ophelia, was considered especially fine. Charles II thought so highly of him that, for the acting of Alvaro in *Love and Honor*, he is said to have lent him his coronation suit. Early in his career he was sent, by the King's wish, to Paris to study the French stage, with a view to improvement in the English—a visit which brought the young dramatist into contact with the work of Molière. His private character was highly estimable, cheerful, modest, and generous. After a retirement of many years it became known that his circumstances were very straitened, and it was determined to give him a public benefit. On April 7, 1709, the spirited veteran (then in his seventy-fourth year) appeared with immense éclat at the Haymarket Theatre in the youthful part of Valentine, in Congreve's *Love for Love*. His last appearance was in a similar benefit three days before his death, as Melantius, in the *Maid's Tragedy*, of Beaumont and Fletcher. He was buried in the cloister of Westminster Abbey—an event which Steele commemorates in the *Tatler* (No 167). As a writer, Bettetton published a number of comedies adapted from earlier plays. Miss Bettetton took almost the same rank among contemporary actresses that her husband did among actors. Consult Howe, "Thomas Bettetton," *Eminent Actor Series* (London, 1891), *The Life and Times of that Excellent and Renowned Actor, Thomas Bettetton*, by the Author of the Lives of Mrs Abingdon, etc. (London, 1888), Doran, *Annals of the English Stage*, vol. 1 (London, 1888), Downes, *Roscius Anglicanus* (London, 1886), Genest, *History of the English Stage*, vol. 1 (Bath, 1832), Galt, *Lives of the Players* (London, 1835), Baker, *History of London Stage and its Famous Players, 1576-1903* (New York, 1901).

BETTINELLI, bet-ti-nel-lē, SAVERIO (1718-1808). An Italian critic and writer on aesthetics. He was born at Mantua, and entering the Society of Jesus taught successively at Brescia, at Venice, at Parma, and at Modena. His principal works were *Il risorgimento d'Italia negli studi nelle arti e nei costumi dopo il mille* (1773-86), on the renaissance of art and literature in Italy, and *Lettere Vespilane*, which aroused much criticism on account of its attacks on Dante. Bettinelli's collected works were published under the title *L'abbate Bettinelli, Opere edite e inedite* (24 vols., 1799-1801). Consult G. F. Napione, *Vita dell' Abbate S. Bettinelli* (Turin, 1819), and Colagrosso, *Gianrico Bettinelli e il "teatro gesuitico"* (Naples, 1890).

BETTING (bet, shortened, from abet, OF abeter, to incite, instigate, deceive, from a (Lat ad), to, + to-bet, Icel, bætta, to bait, to cause to bite). A form of wagering contract in which the payment of a sum of money or the giving of something of value is made to depend on the result of a competition or other uncertain event, as a game, a race, an election, or the like. The

common law did not prohibit such contracts, and they were enforceable like other contracts, though a common gambling house was indictable as a nuisance at common law. While betting, if conducted in an orderly manner and in a proper place, is still generally tolerated by the law, the practice has been much restricted by statute (see GAMBLING), and the right to enforce a betting contract or gambling debt has been taken away by statute.

In 1845 it was enacted by Parliament "that all contracts or agreements, whether by parol or in writing, by way of gaming or wagering, shall be null and void, and that no suit shall be brought or maintained in any court of law or equity for recovering any sum of money or valuable thing alleged to have been won upon any wager, or which shall have been deposited in the hands of any person to abide the event upon which any wager shall have been made" (8 & 9 Vict chap 109, sec xviii). Similar legislation has been enacted in all the United States, and in most of them money loaned for the purpose of making or paying a bet, such purpose being unlawful, cannot be recovered by an action at law. Where a contract, alleged to be a wager, does not show on its face that it is such, it will be presumed to be valid, though the presumption may be rebutted by showing its true character.

While betting has not generally been prohibited, there is an increasing tendency, in the United States (less marked in Great Britain) to attempt its suppression by legal means. Thus most of the States have adopted constitutional provisions prohibiting lotteries under severe penalties (see LOTTERY), while the constitution of the State of New York requires the Legislature by appropriate legislation to prohibit gambling of all kinds. In some of the States, as also in New York, betting on the result of an election for public office disqualifies the bettor from voting at such election.

For wagering contracts deemed lawful, see WAGER, *Wagering Contract*. Consult Rowdace, *Betting and Gambling* (New York, 1905).

BETTS, SAMUEL ROSSITER (1787-1868). An American jurist, born in New Haven, Conn., and graduated at Williams College in 1806. After serving in the War of 1812 he was appointed judge-advocate of the State of New York, and this position brought him prominently before the public. In 1816 he was elected a member of Congress, representing the district comprising Orange and Sullivan counties, and afterward served for several years as district attorney of Orange County. He was judge of the United States District Court from 1823 to 1867. While serving in this capacity he performed the important service of codifying the maritime laws of the United States. Scarcely less noteworthy was the influence of his judicial opinions on the formation of the neutrality and patent laws of the United States. Notwithstanding the enormous volume of business constantly brought to his attention, his decisions during the first 20 years of his term of office were uniformly upheld. Among the distinguished lawyers who conducted cases before him were Hoffmann, Van Buren, Webster, Hall, Emmet, and Choate. His principal publication is a treatise on *Admiralty Practice* (1838).

BETTY, WILLIAM HENRY WEST (1791-1874). An English actor, frequently called "the Young Roscius." In his boyhood he obtained an ex-

traordinary reputation, but failed completely to maintain it as he grew up. He was born near Shrewsbury, but passed most of his childhood in the north of Ireland, where, at Belfast, he appeared upon the stage as Osman in *Zara*, Aaron Hill's adaptation of Voltaire's *Zaïre*, before he was 12 years old. A few weeks later he played in Dublin as Young Norval. He is said to have committed to memory the long rôle of Hamlet in three hours, and popular admiration of his precocious acting was so unbounded that he was thought an easy rival of the greatest tragedians. When he appeared in London, in December, 1804, at both Covent Garden and Drury Lane theatres, the crowds were so great that the troops had to be called out to preserve order. For some time he drew the then unprecedented salary of £100 a night. His social success was equally remarkable. Parliament was once adjourned expressly to see him act Hamlet at Drury Lane, and George III himself presented him to the Queen and princesses. His vogue gradually subsided, however, and in 1808 he left the stage to enter Christ's College, Cambridge. Four years later, at Bath, he resumed his career, which thereafter proved to be quite undistinguished, and in August, 1824, he retired. The rest of his life was passed uneventfully with the fortune he had acquired in his youth. His son Henry Betty (1810-97) was also an actor. Consult Hutton, in *Actors and Actresses of Great Britain and the United States*, vol. II (New York, 1886); Russell, *Representative Actors* (London, 1872?); Doran, "About Master Betty," in *and about Drury Lane and Other Papers* (London, 1881); Graham, *Splendid Failures* (London, 1913).

BETULA. See BIRCH.

BETWA. An unnavigable tributary of the Jumna River in Central India. It rises in the Vindhya Mountains, flows past the towns of Bilhisa and Jhansi, and after a northeastern course of 340 miles, joins the Jumna on the right, about 30 miles to the east-southeast of Kalpi.

BETWEEN WIND AND WATER. That portion of the side of a ship which is in the immediate vicinity of the water line and is sometimes above and sometimes below it as the ship rolls. A shot hole in this locality is dangerous, as it may admit so much water as to cause the loss of the ship, but the close subdivision of the hulls of modern ships near the water line has much minimized the danger.

BETZ, FRANZ (1835-1900). A German operatic barytone. He was born at Mainz, and from 1855 to 1859 sang at Hanover and at various other cities of Germany. From his first appearance in Berlin, in 1859, in the rôle of Don Carlos in Verdi's *Ernani*, until 1897, he was a member of the Royal Opera House, where, prior to May 1, 1870, he had already sung about 850 times. He was selected by Wagner to create the parts of Hans Sachs at Munich in 1868 and of Wotan at Bayreuth in 1876, and thereafter became prominently identified with Wagnerian rôles. He retired in 1897.

BEULÉ, BE'IA', CHARLES ERNEST (1826-74). A French archaeologist and politician, born at Saumur. In 1849 he was sent to Athens as one of the professors of the school of archaeology established there and discovered the propylea of the Acropolis. After his return to Paris he became professor of archaeology at the Bibliothèque Nationale in 1854 and soon won great

reputation by his writings. In 1858-59 he made excavations on the site of Carthage at his own expense. His later years were devoted to politics. In 1871 he was elected to the National Assembly, where he upheld the Orleanist cause. Under MacMahon he was for a short time Minister of the Interior (1873). He committed suicide, April 4, 1874. Among his works are *L'acropole d'Athènes* (2 vols, 1854, 2d ed., 1863), *Etudes sur le Péloponnèse* (1855, 2d ed., 1875), *Les monnaies d'Athènes* (1858), *L'architecture au siècle de Périclès* (1860), *Fouilles à Carthage* (1861), *Phidias, drame antique* (1863), *Histoire de l'art grec avant Périclès* (1868), *Le procès de Césaire* (4 vols, 1867-70). The last-named work dealt with Augustus, Tiberius, Germanicus, and Titus.

BEURMANN, boir'man, KARL MORITZ VON (1835-63). A German African explorer. He was born at Potsdam and studied at the Engineering School, Berlin. In 1860 he made a scientific journey to the Nile, the Nubian Desert, and the Bogos region. He undertook in 1862 an expedition to the African interior, to obtain information about Eduard Vogel (qv), an explorer, murdered—as Nachtigal definitely learned (1873)—in 1856 by order of the Sultan of Wadai. He endeavored to reach Wadai by way of Kanem, but was compelled to turn back. He proceeded to Kuka, capital of Bornu, and thence southwest to Yakoba, capital of Bantshi. In December he once more set out for Wadai, but, robbed and deserted by his servants, had again to return to Kuka. During the following January he started again, but in February was murdered at Mao, on the border between Wadai and Kanem. His *Glossar der Tigris- und Nubien-Sprachen* was published in German and English (1868) by A. Merx, who also wrote a biographical sketch of Beurmann in *Jahresbericht des Leipziger Vereins für Ethnologie* (1866).

BEURNONVILLE, bér'nôn'vel', PIERRE DE RIEL, MARQUIS DE (1752-1821). A French soldier, born at Champignolles (Burgundy). During the Revolution he fought in the Republican army under Luckner and Dumouriez. In 1793 he was appointed Minister of War, and subsequently, when sent by the Convention as one of the commissioners for the apprehension of Dumouriez, was himself taken prisoner and delivered to the Austrians. After his release he was appointed commander of the Army of the North, in 1798 inspector general of infantry, and in 1805 he became Senator. After Napoleon's abdication he declared himself for Louis XVII, whom during the Hundred Days he had accompanied to Ghent. In 1816 he was appointed a marshal of France. Consult A. Chuquet, *Les guerres de la Révolution* (Paris, 1886).

BEUST, boist, FRIEDRICH FERDINAND FRIEDRICH VON (1809-86). A Saxon-Austrian statesman. He was born Jan. 13, 1809, at Dresden and received his university education at Göttingen and Leipzig, after which he entered upon a diplomatic career. After serving at several German courts and at Paris and London, he became, in 1849, Minister of Foreign Affairs in Saxony and in 1853 was made Premier. He represented the German Confederation at the London Conference of 1864 and was the chief exponent of the German national feeling on the question of the incorporation of Schleswig-Holstein with Denmark. An opponent of Bismarck and a friend of Austria, he supported the latter in the crisis of 1866 and ranged Saxony in

opposition to Prussia. After the termination of the Seven Weeks' War he was obliged, at the demand of Prussia, to resign his office. He entered (October, 1866) the Austrian service as Minister of Foreign Affairs, and in the following year was made Imperial Chancellor. It was in this office that his most important work was done, the complete reorganization of the Empire on a dualistic basis. Besides bringing about the *Ausgleich* with Hungary, he carried through important liberal reforms and abrogated the concordat with Rome. The difficulties of procuring harmony between the Germans and Slavs, and the opposition of the Ultramontanes to his plans undermined his influence. In 1871 he was removed and the chancellorship was abolished. He was Ambassador to England from 1871 to 1878, and to France from 1878 to 1882, when he resigned. He died Oct. 24, 1886. Consult his *Memoirs*, Eng. trans. (London, 1887). See AUSTRIA-HUNGARY.

BEUTENMULLER, boi'ten-mul'ler, WILLIAM (1864-) An American entomologist. He was born in Hoboken, N. J., and was educated at a business college in New York City. He was curator of the department of entomology at the American Museum of Natural History from 1889 to 1910, and president of the New York Entomological Society in 1900-01. He was editor of the *Journal of the New York Entomological Society* (vols. 1-11) and is the author of *The Butterflies of the Vicinity of New York City* (1902), *The Insect Galls of the Vicinity of New York City* (1904), *A Manual of American and European Butterflies and Moths* (1906).

BEUTH, boi, PETER CHRISTIAN WILHELM (1781-1853). A Prussian statesman. He was born at Cleve and studied at Halle. In 1801 he entered the Prussian civil service, and in 1810 he was appointed director of the Board of Inland Revenue at Berlin, in which post he did much to improve the condition of finance and industry. After serving in the campaign of 1813, he became a member of the Ministry of Finance. In 1821 he was appointed member of the Council of State, and in 1844 acting privy councillor. He established the Industrial Institute in Berlin, and similar institutes in the provinces, introduced improved methods in manufacturing, and in these and other ways did much to contribute to the furtherance of Prussian trade.

BEUTHEN, boi'ten (generally called Oberbeuthen, to distinguish it from a smaller town of the same name). A town of Prussian Silesia, the capital of a circle of the same name, 50 miles southeast of Oppeln, near the Russian frontier (Map Prussia, II 3). It has manufactures of woollens, marble, and sandstone ware, and bent-wood furniture, but is best known as a mining centre, with zinc, calamine, and coal mines, large smelting works, rolling mills, and iron foundries. It has several Protestant and Roman Catholic churches, a gymnasium, and an ecclesiastical seminary. Beuthen was a Polish town in the twelfth century, but passed to Bohemia, and in 1742 to Prussia. Pop., 1900, 51,409, 1910, 67,718.

BEVEL (Fr. *bivoire*, of unknown origin). 1. In architecture or carpentry, a surface, usually plane, making an angle with the prevailing vertical and horizontal planes of a building. 2. An instrument consisting of two flat, straight-edged legs held by a clamping screw at any desired angle, used for measuring and setting off

bevels or angles of any sort. See CHAMFER, SPALY.

BEVELAND, bā've-lant (land of the open, or beeves), NORTH and SOUTH. Two islands in the estuary of the Scheldt, forming a portion of the Dutch province of Zeeland (qv) (Map Netherlands, B 3). South Beveland is about 22 miles long and 10 miles wide in its widest part. North Beveland is smaller, being only 10 miles long by 3 miles wide. Both islands are thickly inhabited, but have suffered much from inundations of the sea.

BEVEL GEAR. See GEAR WHEEL.
BEVERAGE PLANTS. Plants from whose products the common non-alcoholic beverages are prepared. The principal beverage plants are the tea shrub (*Camellia thea*), the coffee tree (*Coffea arabica*), and the cacao tree (*Theobroma cacao*). Another beverage plant of considerable importance is the *Ilex paraguensis*, whose dry leaves, known as maté, or Paraguay tea, are very extensively used in many localities in South America. The great commercial importance of the principal beverage plants has brought about the introduction of cheap substitutes, some of which are more or less similar in composition to the true products, while others have an entirely different composition and consequently different properties. Among the substitutes for tea may be mentioned on the one hand, maté, guarana, coffee leaves, and kola nut, all of which contain some caffeine (same as theine), and, on the other hand, the leaves of the partridge berry, which contain no caffeine whatever. Other substitutes are enumerated under TEA. The substitutes for coffee include chicory root and the so-called Swedish coffee (*Stragulus baticus*). In some parts of the East Indies the leaves of the coffee tree are generally used instead of the seeds. A tree of the genus *Gymnocladus* (*Gymnocladus canadensis*) is known as the "Kentucky coffee tree," because its seeds were formerly roasted and ground as coffee in Kentucky. See CACAO, CHOCOLATE, COFFEE, MATÉ, TEA, CAFFEINE, THIOBROMINE, ADULTERATION.

BEVERIDGE, ALBERT JEREMIAH (1802-) An American politician and lawyer, born on the border of Adams and Highland counties, Ohio. His family removed to Illinois after the Civil War, and he graduated at De Pauw University in 1835. Afterward he was admitted to the bar. From 1899 to 1911 he was United States Senator from Indiana. He made several impassioned speeches supporting the McKinley Administration's Philippine policy. In 1906 he introduced an amendment to the Agricultural Bill providing for closer inspection of the meat-packing industry. He became one of the leaders of the new Progressive party in 1912. He wrote *The Young Man and the World* (1905), *The Meaning of the Times* (1907), *Americans of Today and Tomorrow* (1908), *Past Prosperity Around* (1912).

BEVERLEY (anciently, *Beevalao*, AS *Befarlic*, from *befer*, beaver + *lao*, lake. The marshes around were the resort of beavers). A market town in the East Riding of Yorkshire, England, 1 mile west of the river Hull (with which it communicates by the Beck Canal, owned by the town) and 8 miles north-northwest of the city of Hull (Map England, F 3). Beverley formerly returned two members to Parliament, but was disfranchised in 1870. The chief architectural feature in Beverley is the superb Gothic

BEVERAGE PLANTS



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1 MATE - ILEX PARAGUENSIS
2 COFFEE TREE - COFFEA ARABICA

3 CACAO TREE - THEOBROMA CACAO
4 TEA SHRUB - CAMELLIA THEA

minster, or the Church of St John the Evangelist, ranking next to York Minster among the ecclesiastical structures of the county and exhibiting different styles of Gothic architecture, the oldest part being of the thirteenth century. The choir contains the celebrated Percy shrine, of the most exquisite workmanship. St Mary's Church, a cruciform building, is also a very beautiful structure. Beverley arose out of a priory founded about the year 700 by St John of Beverley, whose shrine there was visited by multitudes of pilgrims in medieval times. Industries include iron founding, brewing, and the manufacture of chemicals of various kinds, and there is considerable trade in farm products. Pop., 1891, 12,500, 1901, 13,200, 1911, 13,654. Consult Oliver, *Histories* (Beverley, 1829), Foulson, *Beverley, an Antiquities and History of the Town of Beverley* (London, 1829), Stephenson, "Beverley in the Olden Times," in *Archæological Journal*, vol. 11 (London, 1895).

BEVERLEY, ROBERT (1675-1716). A Colonial historian of Virginia. He was of a good and wealthy family, was educated in England, and later had charge of the public records of the Colony. In 1705 he published, in London, a *History and Present State of Virginia*. This was something more than the title implied, for it gave an account of the Colonial government from the first settlement. It attracted so much attention that in 1707 a French translation appeared, and in 1722 an enlarged second English edition. A modern reprint, with an introduction by Charles Campbell, was published in Richmond (1855). No writer gives us more intimate details of the daily life in Virginia during the first century of its settlement, and few books published during the Colonial epoch furnish more racy, interesting reading. The historian's name is sometimes spelled *Beverly*. Consult Trent, *American Literature* (New York, 1903) and id., *Southern Writers* (New York, 1905).

BEVERLY. A city in Essex Co., Mass., 18 miles northeast of Boston, on the Boston and Maine Railroad. It is situated on a narrow coast inlet, which is spanned by a bridge joining it with the city of Salem (Map Massachusetts, F 2). The city is a popular summer resort, contains a fine post office and public library, a historical society, Beverly Hospital, the Beverly Industrial School, and the New England Industrial School for Deaf Mutes. The city is the centre of the shoe machinery industry, and also manufactures boots and shoes, belting, oiled clothing, carriages, etc. It is the distributing station for the products of the Texas oil fields, a regular line of steamers running between Beverly and Port Arthur, Tex. First settled in 1626 by Roger Conant, Beverly formed part of Salem until 1668, when it was incorporated as a town under its present name. Beverly was chartered as a city in 1894. The government is vested in a mayor and a unicameral council. Ex-President William H. Taft made Beverly his "summer capital" during his administration. Pop., 1910, 18,650. Consult Stone, *History of Beverly* (Boston, 1843), and Thurd, *History of Essex County* (Philadelphia, 1888).

BEVERLY'S FORD, BATTLE OF. See BRANDY STATION, BATTLE OF.

BEVIS. Lord Marmion's "red-roan charger," in the poem "Marmion," by Scott.

BEVIS MARKS. The name of a street in

St Mary Axe, near Houndsditch, London. Here lived Mr Sampson Brass, Quilp's boon companion, in Dickens's *Old Curiosity Shop*.

BEVIS OF HAMPTON, SIR (also known as Bevis of Southampton, and in French as Beuves d'Hantone). An English knight whose adventures in Britain, Europe, and Palestine are the theme of prose and verse by Old English, French, and Italian writers. The era in which he lived was variously placed by them in the time of King Arthur, of Edgar of Britain, and of Charlemagne. His father, Sir Guy, Earl of Hamptoun, was murdered by Divoun, Emperor of Almayne, and his mother gave him to some merchants, who sold him as a slave to the Paynim. They carried him to Ermony, where he married Josian, a daughter of King Ermyrn. Josian gave Bevis his famous horse, Arundel, which figures in many of the legends about him, and he also had a wonderful sword, Morglay. His exploits included the slaughter of a huge boar, two sea-serpents, and a dragon, and he also conquered the giant Ascapard, who became his squire. Another legend describes his carrying his own death warrant in a sealed letter to the vassal Brademond, his escape after seven years' imprisonment, and his rescue of his wife, who had been forced to marry King Mombraunt. His last great adventure was a fight in the streets of London, in which he slew 60,000 citizens, and forced favorable terms from King Edgar. Consult Kolbing, in Ellis's *Early English Metrical Romances* (1885-94), Robinson, *The Irish Loves of Guy of Warwick and Bevis of Hampton* (Zeitschrift für celtische Philologie, vol. 6, pp. 9-180, 273-338 (Halle, 1907-08)), Wolf, *Das Gegenseitige Verhältnis der germanischen Fassungen des festländischen Bueve de Hantone* (Göttingen, 1912).

BEWICK, BŪTĪK, THOMAS (1753-1828). An English engraver, the founder of modern wood engraving. He was born at Cherryburn House, near Newcastle-on-Tyne, Aug. 12, 1753, and was in 1767 apprenticed to Ralph Beilby at Newcastle. His first work of importance was a series of cuts for children's books, the best of which appeared in the 1775 edition of Gay's *Fables*. At the close of his apprenticeship in 1776 he went to London, but soon returned to Newcastle, where he formed a partnership with Beilby. His most important productions of the following years were another edition of Gay's *Fables* (1779) and *Select Fables* (1784). In these works his designs were based on previous prints, upon which, however, he greatly improved. He obtained a fine opportunity to follow his own designs in the *General History of Quadrupeds* (1790). At this time he also engraved what is regarded by many as his masterpiece, a large print entitled "The Chillingham Bull" (1789). His greatest work, however, is the *History of British Birds* (2 vols., 1797, 1804), in which he displays a close and admirable observation of nature, coupled with intense humor and pathos. Excellent also are his cuts for the *History of English Fishes*, a work which he did not live to complete, which appeared in the eighth edition of *British Birds* (1847). In 1798 his partnership with Beilby was dissolved. Among the many books which he illustrated on his own account were Thomson's *Seasons* (1805), Burns's *Poems* (1808), Ferguson's *Poems* (1818), and especially Aesop's *Fables* (1818), in which he was assisted by his son Robert. His last work, entitled "Waiting for Death,"

represents an old woinout hoise, with great pathos and truth. He died Nov 8, 1828, at Newcastle Bewick, more than any other man, was instrumental in the modern revival of wood-engraving. He was one of the first to cut into the end of the block instead of the side, and, more important than this, he was the inventor of the white line, the essential feature of modern engraving, in which the design is cut into the block instead of being left standing (see WOOD ENGRAVING). Consult his *Memoir* (London, 1846), and especially Thomson, *Life and Works of Bewick* (ib., 1882), Dobson, *Bewick and his Pupils* (ib., 1884), and Linton, *Masters of Wood-Engraving* (ib., 1889), a sound and interesting account of Bewick's artistic activity, written by a great wood engraver. The British Museum possesses an admirable collection of his prints.

BEWLEY, bā'li, ANTHONY (1804-60) An American clergyman and abolitionist. He was born in Tennessee, began preaching in that State as a minister of the Methodist church in 1829, and in 1843 entered the Missouri Conference. When the church divided on the slavery question, he adhered to neither side, but preached independently and earned his living by manual labor. In 1848 the church was organized in Missouri, and he came back to its service. In spite of the universal persecution of "abolition preachers," he was throughout a vigorous assailant of slavery. In 1858 he was sent to Texas, but was soon driven out by threats of violence. In 1860, however, he returned to the work, saying to protesting friends "Let them hang or burn me if they choose, a hundred will rise out of my ashes." Within a few weeks he was again compelled to leave Texas. He was kidnapped in Missouri and hanged at Fort Worth, Texas.

BEX (Lat bex, twice, double + OF *as*, Lat *aqua*, water, referring to the junction of the Rhône and Aarçon) A picturesque village in the canton of Vaud, Switzerland, situated on the Aarçon, a tributary of the Rhône, about 26 miles southeast of Lausanne (Map Switzerland, B 2). It is remarkable for its extensive salt mines, salt works, and sulphur baths. These baths and the mild climate have made the town a popular watering place. Pop., 1900, 4600, 1910, 4817.

BEXAR, *Mex Span* bā-ar', *Castilian Span* bā-ātr', SAN ANTONIO DE See SAN ANTONIO.

BEXHILL A municipal borough and seaside resort in Sussex, England, on the English Channel, 4½ miles west of Hastings (Map England, G 6). It owns the electric lighting plant and a cemetery and maintains a kursaal, or amusement pavilion of the German type. It was incorporated in 1902. The old village is inland and has the fine church of St Peter. Pop., 1891, 5200, 1901, 12,200, 1911, 15,330.

BEY, bā, or **BEG** (Turk *beg*, pronounced bā) A title of rank, rather vague in its import, commonly given in Turkey and elsewhere to superior military officers, ship captains, and distinguished foreigners. More strictly, it applies to the governor of a small district, who bears a horse tail as a sign of his rank. The Governor of Tunis, for example, has this title *Beglerbeg*, or *Beylerbeg*, 'lord of lords,' is the title given to the governor of a province, who bears three horse tails as his badge of honor. See BASILIT.

BEYER, bē'er, SAMUEL WALKER (1805-) An American geologist and mining engineer. He

was born at Clearfield, Pa., and graduated at the Iowa State College in 1889. He became a member of the Iowa Geological Survey in 1892 and of the United States Geological Survey in 1901. He was made professor of geology and mining engineering in 1898 and vice dean of the engineering division in 1908, in Iowa State College. He is the author of *Clay and Clay Industries of Iowa* (1903), *Iowa Quarries and Quarry Products* (1906), *Iowa Peat Deposits* (1908).

BEYEREN, bē'er-en, or **BEIJEREN**, ABRAHAM VAN (1620 or 1621-c 1674) A Dutch painter of still life. He was born at The Hague and practiced chiefly there and at Delft, but also in other Dutch cities, impelled, it would seem, by poverty. This is astonishing, as he was one of the foremost genre painters of Holland. His pictures, excellent in arrangement and charming in color, represent every variety of still life, but he is, par excellence, the painter of fish. His numerous works are found in all the principal European galleries, particularly in those of Holland and Germany.

BEYERLEIN, bē'er-lin, FRANZ ADAM (1871-) A German novelist and playwright, born at Meissen and educated at Freiburg and Leipzig. His *Jena oder Sedan?* (1903, Eng. trans., 1913), and *Zapfenstreich* (1903), a play, both dealing with conditions in the modern German army, created a remarkable sensation. The latter was produced in the United States as *Taps*. He also wrote the tragedy *Damon Othello* (1895) and *Similde Diegswalt* (1904), *Der Grossnecht* (1905), *Stub und weide* (1910), *Das Wunder des heiligen Petrus* (1911).

BEYLE, bāi, MARIE HENRI. See STENDHAL.

BEYLERBEG SERAI, bā'li beg' sā-ir' (Turk *beyler beg*, prince of princes + *sarai*, Aisrāy, sarāya, Hind *serāi*, Pers *serāi*, palace, court, see BEX) A magnificent summer palace in Constantinople, built by Abdul Aziz on the Bosphorus in 1865. It is a fine example of the Moorish style of architecture, the staircase and saloons being especially noteworthy.

BEYRICH, bē'rik, HEINRICH ERNST (1815-96) A German paleontologist and geologist, born in Berlin. He became professor of geology and paleontology at the university in that city and was associate director of the Prussian Geological Survey. As part of his administrative work on the geological survey of Prussia, he directed the preparation of the "Geological Chart of Prussia and the Thuringian States." The researches in paleontology, with which his name is most closely associated, resulted in the publication of several important works, among which are *Beitrag zur Kenntnis der Eiscnerungen des rheinischen Ubergangsgewässers* (1837), *Untersuchungen über die Trilobiten* (2 vols., 1846), *Die Conchylien des norddeutschen Tertiargebirges* (1853-57), *Über einige Cephalopoden aus dem Muschelkalk der Alpen* (1867). Consult Dames, *Gedächtnisrede auf Ernst Beyrich* (Berlin, 1896).

BEYROUT, bā'rut or bā-rut' See BEIRUT.

BEYSCHLAG, bē'shlic, ADOLF (1845-) A German conductor and writer on music. He was born in Frankfurt and graduated from the Technical High School, but chose music as his profession. From 1865 to 1868 he studied with Vincent Lachner in Mannheim. In 1868 he began his career as operatic and concert conductor, filling positions in Cologne, Trier, Frankfurt, and Mayence. He settled in Belfast in

1880, where he directed the Philharmonic Society, but soon accepted an offer from the Leeds Philharmonic Society. In 1902 he returned to Germany, taking up his residence in Berlin. His songs and compositions for pianoforte are remarkable for their thorough mastery of form. His most important and valuable work is *Die Ornamentik der Musik* (1908), the result of original and scholarly research.

BEYSCHLAG, WILLIBALD (1823-1900). A German Protestant theologian. He was born at Frankfurt-on-the-Main and studied theology at Bonn and Berlin from 1840 to 1844. In 1856 he became court preacher at Karlsruhe and in 1860 was called to the chair of practical theology at Halle. With Wolters he founded the *Deutsche evangelische Blätter*, and in 1880 he was a prominent organizer of the so-called Evangelical Alliance, for the safeguarding of German Protestant interests. His works include *Christologie des Neuen Testaments* (1860), *Der Altkatholizismus* (1882), *Leben Jesu* (2 vols, 1885), *Neutestamentliche Theologie* (2 vols, 1891-92, Eng. trans, 1896), *Aus meinem Leben* (1896-98), *Melanchthon und sein Anteil an der deutschen Reformation* (1897), *Christenlehre auf Grund des kleinen lutheranischen Katechismus* (1900).

BEY-SHEHR. See BEG-SHEHR.

BEZA (properly DE BÈZE) THÉODORE (1519-1605). Next to Calvin, the most energetic and influential of the Genevese reformers. He was born of a noble family at Vezelay, in Burgundy, June 24, 1519. He received an admirable education in Orleans and Bourges (1528-35) from Melchior Wolmar, a German, who was especially learned in the Greek language, and also imbued with the principles of the Reformation, which he communicated to his pupil. In 1535 he went back to Orleans, studied law and obtained his degree as licentiate of civil law. He then went to live in Paris, where he appears to have spent several years in a kind of fashionable dissipation, though he does not accuse himself of any gross profligacy. Beza possessed a handsome figure, which, together with his fine talents and good birth, opened to him the most brilliant prospects. Although not a priest, he pocketed the incomes of two benefices, while his income was largely increased by the death of an elder brother. He abandoned the law and took up literature, and distinguished himself as a wit, a scholar, and a poet. In 1548 he published *Juvenilia*, a volume of poems, which gave him high rank among the Latin poets of his day. Only malice and ignorance could twist them into even occasional indecencies, but they were, by the enemies of the Reformation, persistently vilified after their author had become a Protestant leader. Beza himself, in after-life, regretted having published frivolous verses, because he had come to see no value in anything which was not distinctly religious.

It was the desire of his relatives that he should enter the Church, but a private marriage which Beza had contracted in 1544 rendered this impossible. A severe illness attacked him in 1548, during the lapse of which the folly and selfishness of his career vividly presented themselves to his conscience, he repented, and on his recovery, in order to avoid the perils and perplexities of his position, he went to Geneva, along with his wife, October, 1548. In 1549 he was appointed Greek professor at Lausanne, an

office which he held for 10 years. In 1550 he published with success a drama entitled *The Sacrifice of Abraham* and delivered lectures on the Epistle to the Romans and the Epistles of Peter to crowded audiences. Out of these lectures ultimately sprang his translation of the New Testament into Latin. In 1559 he went to Geneva, where he became Calvin's ablest coadjutor and was appointed a theological professor and president of the college. He had already signalized himself by his work *De Haereticis a Civili Magistratu Puniendis*, in which, like many other good but mistaken men, he approved of the burning of Servetus. His diplomatic tact was very pronounced. He induced the King of Navarre to evict his influence on behalf of the persecuted French Protestants and was persuaded by the latter to attend the conference of Catholic and Protestant divines held at Poissy in 1561. Here his courage, presence of mind, and dexterity made a very favorable impression on the French court. While in Paris, he often preached before the King of Navarre and Conde. On the outbreak of the Civil War (1562) he accompanied the latter as a kind of military chaplain and after his capture attached himself to Coligny. In 1563 he once more returned to Geneva. In the following year Calvin died, and the care of the Genevese church now fell principally upon Beza's shoulders. He presided over the synods of French reformers held at La Rochelle in 1571 and at Nîmes in 1572. In 1574 he was deputed by Conde to transact important business at the court of the Palatinate, and in 1586 measured himself with the Wurtemberg divines, especially Jacob Andreae, at the religious conference held at Montbéliard. In 1588 his first wife died, and, although verging on 70, he married again the next year—a circumstance which his enemies, the Jesuits, tried to turn against him, but Beza, who still retained complete mastery over his faculties, retorted with his accustomed liveliness and skill. His first wife was Claudine Denosse, a burgher's daughter, his second was Catherine del Piano, the widow of a Genevese. He had no children by either wife, but he adopted the niece of the first, Genevieve Denosse, and the granddaughter of the second. In 1597 his calumniators spread the report that Beza was dead and at the last hour had returned to the bosom of the Church. The witty patriarch replied in an epigram full of sparkling vigor. He died Oct 13, 1605, at the age of 86.

Beza was thoroughly grounded in the principles of his master, Calvin, in whose spirit he vigorously ruled the Genevan church for 40 years, exercising the influence of a patriarch. By his abundant learning, his persevering zeal, his acute intellect, his great eloquence, and his impressive character he rendered important services to his church. He was the born gentleman among the Reformers, and so was often chosen to represent the French Reformed church in dealing with royalty and aristocracy. His numerous theological writings, however, cannot be said to have proved attractive to posterity. They have almost ceased to be read. The works by which he is best known are his translation of the New Testament into Latin (1556), his editions of the Greek New Testament (1565), largely based upon that of Robert Stephens (1550), and his biography of John Calvin, which was the first written. He presented the University of Cambridge with the uncial New

Testament Manuscript known as "Codex Bezae" or "Codex D." His collected works bear the title *Tractationes Theologicae* (2 vols., Geneva, 1582). He was editor of *Histoire ecclesiastique des églises réformées au royaume de France* (best ed. Baum and Cunitz, 3 vols., Paris, 1883-89). His *Life of Calvin* has been translated by Beveridge (Philadelphia, 1909). For his biography, consult H. M. Baird (New York, 1899).

BEZALIEL, be-zā'li-él. A character representing the Marquis of Worcester, afterward Duke of Beaufort, in Dryden and Tate's satire, *Absalom and Achitophel*.

BEZAN CODEX. See BIBLE.

BEZANT' See BESANT.

BEZBORODKO, byēz'bō-rot'kō, ALEXANDER ANDREYEVITCH, PRINCE (1747-99). A Russian general and statesman. He was born in Little Russia, and, after receiving his secondary education at the clerical academy of Kiev, entered the government service, first in administrative departments and next in military. Rising rapidly in rank, he became second in command to Field Marshal Rumiantsev in the Russo-Russian campaigns, and in 1780 was appointed secretary of the council on foreign affairs. As a favorite of Catherine II, who appointed him her private adviser, he dictated much of her foreign policy, favorably concluded the wars with Gustavus III (1790), and the one with Turkey in the Peace of Jassy (1791). During the American War for independence, Bezborodko participated in framing and passing Russia's neutrality acts. After the coronation of Paul he was appointed (1806) Imperial Chancellor, the highest honorary office in Russia, and two years later was commissioned to effect an Anglo-Russian alliance against France. His influence was largely responsible for the third partition of Poland, for numerous fiscal and other reforms, and for several bold strokes of diplomacy that greatly affected the course of Russian history. His extreme tact and unusual knowledge of men is attested by the fact that he was the only Russian minister who managed to remain in favor with the phlegmatic Czar Paul till the very last. For his biography consult N. G. Ignatievitch, *Chancellor Prince Alexander Andreyevitch Bezborodko* (2 vols., St. Petersburg, 1879-1881).

BEZETH. A place of doubtful situation, but apparently near Jerusalem. It is mentioned in I Mace vii 19, as the place where Bacchides encamped. Josephus calls it Bethzetho (*Ant.* xii, 10, 2).

BÉZIERS, bā'zyā' (from Lat. *Betaria*, see below). A city of France, formerly the seat of a bishopric, in the department of Hérault, situated on the slope of a hill, at the junction of the Orb and the Canal du Midi, about 47 miles southwest of Montpellier (Map France, S, II 5). It contains some interesting buildings, the principal being the cathedral of St. Nazaire, and the ancient episcopal palace, employed since the removal of the see for government offices. The city has a communal college, a society of economies and archaeology, a library and a museum. The old citadel has been destroyed, but the walls still remain and are made use of as a promenade. Béziers has manufactures of silk stockings, woollens, gloves, parchment, glass, soap, leather, and famous confectioneries, and industries connected with the wine trade such as cask and cork making, etc. It has also extensive brandy distilleries and is the centre of most of the trade of the district. The town is

supplied with water pumped up from the Orb. Pop., 1906, 52,268, 1911, 51,042. Béziers was from immemorial times a fortress town, first Gallic, then Roman. It was during the Roman occupation named first *Betaria*, then *Betara Septimanorum*, and was the station of the Seventh Legion, and still contains Roman remains. It is historically interesting in connection with the massacre of the Albigenses, when its inhabitants were indiscriminately put to the sword to the number of over 20,000 by Simon de Montfort and the Pope's legate, for having afforded protection to the fugitives in 1209. Béziers suffered also in the religious wars of the sixteenth century.

BÉZIQUE, bā-zēk' (Fr. *besique*, origin obscure). A game of cards (of which there are many variations) ordinarily played with a double pack, from which the twos, threes, fours, fives, and sixes have been rejected, thus leaving 64 cards. The remaining cards rank aces, tens, kings, queens, knaves, nines, eights, sevens. Eight cards are dealt (first, three, then two, then three) to each player, and the seventeenth is turned up for trumps. If this card be a seven, the dealer scores 10 points at once. Tricks are taken as in whist, except when the cards are equal, such as two tens together, when the leader wins the trick, and that the player need not follow suit even in trumps so long as there are cards in "stock," i.e., remaining over from the deal. After each trick the player draws one card from the stock, the winner taking the top card and the loser the next, the trump card, or the one exchanged for it, being taken up last. The object of the game is to promote in the hand various combinations of cards which, when declared, entitle the holder to certain scores, to win aces and tens, and to win the last trick. If a declaration is made it must be as soon as the trick is taken, and before drawing from the pack, and this is done by placing the declared cards face upward on the table, but they still form part of the hand, and can be led or played, just as though they had not been declared.

The game is usually 1000 points, and the scores vary from 10 for the seven of trumps played or exchanged, to 500 for double bezique.

There are three classes of combinations which may be announced and scored, as follows: (A) Marriages and sequences, (1) king and queen of any plain suit, *marriage*, 20 points, (2) king and queen of trumps, *royal marriage*, 40 points, (3) sequence of 5 highest trumps, *sequence*, 250 points. (B) *Béziques*, (1) spade queen and diamond jack, *bezique*, 40 points, (2) two spade queens and diamond jacks, *double bezique*, 500 points. (C) Fours of a kind, (1) any four aces, 100 points, (2) any four kings, 80 points, (3) any four queens, 60 points, (4) any four jacks, 40 points. The four card cards in class C may include two of the same suit or may include all of different suits.

Another form of the game, which is common, and is called Rubicon *bézique*, is played with four piquet packs of 32 cards each, all cards below the sevens having been eliminated. The cards rank as in straight *bézique*. Nine cards are dealt to each player, but no trump is turned. The combinations which may be made and scored are the same as in straight *bézique*, but of course, are more frequent. Rubicon *bézique* may be said to resemble straight *bézique* as railroad euchre does straight euchre. There are many

other forms of the game, including the following Chinese bezique, chouette bezique, penchant, cinq-cents, four-handed, Polish bezique, three-handed, and bid euche. Consult *Foster's Complete Hoyle* (New York, 1909).

BEZOAR, bē'zōr (through Sp. from Pers *pād zah*, literally, against poison). A concretion found in the stomachs of goats or antelopes, and formerly much valued on account of imaginary medicinal virtues, particularly as an antidote to poisons, though really worthless. Concretions of various kinds are found in the stomachs of herbivorous quadrupeds, very generally having for their nucleus some small indigestible substance which has been taken into the stomach. Sometimes they are of a radiating structure, sometimes formed of concentric layers, sometimes they are principally composed of superphosphate of lime, sometimes of phosphate of ammonia or magnesia, and sometimes they are mixed with hair. Other concretions found in the intestines of various animals are sometimes also called bezoar. See CALCULUS (in medicine).

BEZOLD, bá'tsolt, KARL (1859-) A German philologist, born at Donauworth, Germany. He was educated at the universities of Munich, Leipzig, and Strassburg. In 1883 he became lecturer at Munich, and from 1888 to 1893 lectured at the British Museum, London. In the following year he was appointed professor and director of the Oriental seminars at the University of Heidelberg, and in 1908 he became privy counselor. Besides several translations including *Babylonschen-assyrischen Texte* (2d ed., 1911), and also works from the Arabian and Ethiopian languages, he is author of *Schatz-höhle* (1883, 1888), *Catalogue of the Cuneiform Tablets in the Kouyunjik Collection of the British Museum* (1889-99), *The Tell el-Amarna Tablets in the British Museum* (1892), *Oriental Diplomacy* (1893), *Ninive and Babylon* (3d ed., 1909), *Die Babylonschen-assyrischen Keilschriften und ihre Bedeutung für die Alte Testament* (1904), "Feestschrift für Ignatz Goldziher" in *Zeitschrift für Assyriologie und Verwandte Gebiete* (1912).

BEZOLD, WILLHELM VON (1837-1907). A German meteorologist, born in Munich. He studied at the universities of Munich and Göttingen, in 1866 was appointed professor in the former, and subsequently professor in the Technical Institute of Munich. In 1885 he accepted the chair of meteorology at Berlin and at the same time became director of the new Meteorological Institute. His investigations in thermodynamics are important. His publications include *Die Farbenlehre im Hinblick auf Kunst und Kunstgewerbe* (1874), *Die Koloristikfalle im Mus* (1883), *Zündende Blitze im Königreich Bayern* (1884), *Zur Theorie des Erdmagnetismus* (1897), *Ergebnisse der Meteorologischen Beobachtungen* (48 vols., 1885-1902). Consult Hellman, *Willehm von Bezold, Gedenksrede* (1907).

BEZO'NIAN (It *bisogno*, need, needy fellow, beggar, Fr *besson*, need, want). An Elizabethan term, of continental derivation, applied to either "needy" or "needed" persons, but in both cases denoting a low and useless member of society, needed to fill up mercenary ranks, etc.

BEZOUT, bá'zot, ETIENNE (1730-83). A French mathematician. He was born in Nemours and died in Paris. One of the best-known writers of his day on mathematics, he

made considerable contributions to the theory of elimination and was one of the first to recognize the value of determinants. His *Théorie générale des équations* (Paris, 1779) and his *Cours complet de mathématiques* (Paris, 1780) are his best-known works.

BEZSONOV, býz so'nov, PETER ALEKSEYEVICH (1829-98). A Russian student of folklore. He was born in Moscow, and graduated at Moscow University in 1851. After five years of graduate work in ancient and modern languages, he entered the government printing commission. From 1864 to 1867 he was supervisor of the Vilna Museum and Public Library, besides serving as director of education in the same city. For the two following years he was librarian at Moscow University. Having received an honorary doctor's diploma in Slavonic philology from Kazan University, he became professor of Slavic languages at the University of Kharkov in 1879, remaining in this position till his death. He published *Bolgarskaya Pyesni* (1855), the first great collection of Bulgarian folk songs, a collection of Serbian folk songs, under the title of *Lazavica* (1857), several collections of Russian songs (1861-71), and a number of treatises on the Bulgarian, Serb, and Russian languages and literatures.

BEZZENBERGER, ADALBERT (1851-) A German philologist, born at Kassel. He studied the Indo-Germanic languages at the universities of Göttingen and Munich. In 1874 he became lecturer at Göttingen and in 1879 professor of Sanskrit at Königsberg. In 1890-91 he was rector of the university. His works include *Beiträge zu Geschichte der Litauischen Sprache* (1877), *Litauische Forschungen* (1882), *Letische Dialektstudien* (1885), *Ueber der Sprache der Preussischen Letten* (1888), *Die Kunst der Nahrung und ihre Bewohner* (1889), *Sitzungsbericht der Altertums-gesellschaft Pussia* (1892), *Analysen der vorgeschichte Bronzen Ostpreussia* (1904), *Beiträge zu Kunde der Indogermanischen Sprachen* (1877-1906).

BHAGALPUR, ba'gál-poor', or BOGLI-POOR, bog'li-poor' (Hind *bhagal*, tiger + *Skt. pūr*, city). The capital of a district and division of the same name in Bihar and Orissa, Bengal, British India, lat 25° 11' N, long 87° E (Map India, E 3). It stands on the right bank of the Ganges, which is here 7 miles wide in the rainy season, and is 265 miles northwest of Calcutta by rail. The situation is unhealthy, malaria is endemic and cholera is epidemic. Tejnarayan Jubilee College (established in 1887) is maintained almost wholly by fees. The city is the headquarters of the troops for keeping in check the Sonthal tribes. Coarse silk goods are manufactured. Pop., 1901, 75,760, 1911, 74,349. In the vicinity of the town two round towers, about 70 feet in height, of unknown origin, are objects of interest, as are also the British and native monuments to Augustus Cleveland (1755-84), whose administration did much to advance civilization in this district. Bhagalpur district contains 4220 square miles. Population, 1901, 2,088,953, 1911, 2,139,318. It lies south of Nepal, in lat 24° 17' to 26° 20' N, long 86° 15' to 88° 3' E. About a fifth is covered by hills, which, stretching to the southwest, connect with the Vindhya Mountains, the grand dividing ridge between the Nerbudda and the Ganges (cereals, pulses, tobacco, cotton, indigo, opium, flax, hemp, and sugar cane are the principal products, and there is a large trade by river

and rail with lower Bengal. The division of Bhagalpur, comprising four districts, has an area of 19,776 square miles. Pop., 1901, 7,844,823, 1911, 8,144,821.

BHAGAVAD-GITA, b'ha'gū-vād-gē'ta (Skt., 'the Song of the Blessed,' i.e., rhythmically recited by Krishna, an incarnation of the god Vishnu), or the DIVINE SONG, SONG CELESTIAL, SACRED CANTICLE. The name of a Sanskrit religious and philosophical poem of some 700 double verses, which forms an episode in the *Mahābhārata* (q.v.). The title *Bhagavad gītā*, feminine, is best explained by understanding after it the noun *upaniṣad*, the significance being a philosophical treatise rendered in metre by the Blessed One. This remarkable production, in the form of a colloquy between the divine Krishna and the hero Arjuna, comprises 18 cantos in the sixth book of the *Mahābhārata* (6251—64278 = 11830—1532). The situation is a striking one. The rival armies of the Kurus and Pandus, foemen allied by the ties of family and blood alike, but severed by a fatal feud, are drawn up against each other in battle array. Before the final signal is given, Arjuna, the valiant leader of the Pandu hosts, hesitates to fight, foreseeing the awful slaughter and the bloodshed of kindred that must ensue. The divine incarnation of Vishnu, in the form of Krishna, as Arjuna's charioteer, overcomes his scruples and dispels his doubts by a long discourse on life and duty, and the part which every one must play in fulfilling his obligations in the world. Action is inevitable in the performance of duty, but in devotion to the Supreme Spirit alone is salvation to be found. A vision of the Supreme Spirit is revealed to Arjuna in the transfigured image of Krishna, as described in Canto xi, 15 seq.

This philosophic discourse, hallowed by its association with the most momentous battle of ancient India, which follows at its close, has exercised great influence upon the Hindu thought and mind from the earliest times to the present. The allegorical interpretation of it as bearing upon the contending forces of rival passions is a favorite one with modern theologians, and the *Bhagavad-gītā* has been looked upon for ages as a sacred text-book. The date of the poem, however, and its precise relation to the Great Epic, is a subject of much discussion. Scholars who do not regard this didactic piece as an integral part of the *Mahābhārata*, nevertheless consider it to be undoubtedly one of the older poems in the epic, though not necessarily an old part of it. The critical tendency at present is to place the piece in the centuries preceding the Christian Era rather than following it. Its composition has been assigned to the second century B.C., and its redaction to the second century A.D. Points of resemblance between *Gītā* and the New Testament need not claim any necessary consideration. From the standpoint of philosophy the *Bhagavad-gītā* is generally regarded as combining the Sankhya doctrine of matter and spirit with the Yoga tenets of meditation and Vedānta pantheism, although as a poem it has no really consistent system, and it is regarded by some as probably composed prior to the formal Vedānta and the formal Sankhya as actual schools. Consult the articles under these names.

Editions of the *Bhagavad-gītā*, criticisms and discussions of the poem, especially in India, number scores. The earliest printed edition of

the Sanskrit text is by a Brahman, Baburama (Calcutta, 1808). There are modern versions in most of the Indian vernaculars. For the earliest European translation into English, consult C. Wilkins (London, 1795, revised ed., Bombay, 1887). For later English renderings, consult Thomson (Hertford, 1855), Davies (London, 1882, 3d ed., 1893), Sir Edwin Arnold, *The Song Celestial*, metrical (London and Boston, 1885), M. N. Dutt (Calcutta, 1895), Barnett (in the *Temple Classics*, London, 1905), C. Johnston (New York, 1908), R. Garbe (Leipzig, 1905), and especially Telang, *Bhagavad gītā, Sacred Books of the East*, vol. viii (Oxford, 1898). For full information as to German, French, and Italian, consult Holtzmann, *Das Mahābhārata*, vol. II (Kiel, 1893), and Von Schröder, *Indiens Literatur und Kultur* (Leipzig, 1887), E. W. Hopkins, *Religions of India* (London, 1906), Frazier, *Literary History of India* (London, 1898), Wintomitz, *Geschichte der indischen Literatur* (Leipzig, 1908), Bhandarkar, *Vaishnavism, Saivism, and Minor Religious Systems* (Strassburg, 1913).

BHAMO, ba-mō'. A town of Burma, British India, on the upper Irrawaddy, 40 miles west of the Chinese frontier, and 180 miles north-northeast of Ava (Map Burma, C 2). The former capital of a Shan principality, it was a large and flourishing city, but fell into decay. It is, however, important as the chief mart of the trade with China, through western Yun-nan, a British consulate at Manwyne, Yun-nan, since 1893, greatly facilitating commercial intercourse. The imports are woollens, cottons, and silks, which are brought chiefly by caravans. Bhamo has also a considerable trade with the tribes of the neighborhood, who exchange their native produce for salt, rice, and a sauce made of dried fish. It is at the head of navigation on the Irrawaddy, and steamers ply to Rangoon. Pop., 1891, 10,734, 1911, 9,762.

BEANG, bang (Hind. Skt. *blāncā*, hemp). 1. The Eastern name for the Indian variety of the common hemp. 2. A narcotic made from the Indian hemp. The larger leaves and capsules are used, and the preparation is smoked with or without tobacco, chewed, or made into a drink by infusing in cold water. See HEMP.

BHARAL. See BURNEL.

BHARATPUR, b'ha'rāt-pūr', or **BHURT-PÖRE**, -pōr' (*Bhurat*, the brother of Rama + Skt. *pur*, city). The capital of the native state of the same name in Rajputana, India, in lat. 27° 12' N. and long. 77° 33' E. (Map India, C 3). Pop., 1901, 43,601, 1911, 33,918, about one-half the population for 1881, the decrease in that period having been 48.7 per cent. due to many causes, such as poverty, famine, and emigration. It is historically important owing to the sieges of 1805 and 1827. The strength of the place lay in a mud wall, which was shot-proof, and a surrounding ditch, which might at any time be filled with water from a neighboring lake. The state of Bharatpur is situated in lat. 26° 48' to 27° 50' N. and in long. 76° 54' to 77° 49' E. Its area is 1982 square miles. Pop., 1901, 626,065, 1911, 558,785. The country suffers from want of water, but in many parts the soil is rendered highly productive by means of irrigation. The principal crops of the state are grain, cotton, and sugar.

BHARAVI, b'ha'rā-vā'. A poet of India, belonging probably to the seventh century A.D.

He is known as the author of the *Kuṭāṭ-juniya*, an artificial epic, based upon an episode of the national epic of the *Mahābhārata*. The *Kuṭāṭjuniya* was first published at Calcutta in 1814 and since then has appeared in several editions, of which the best are those of Godabole and Paraba (1885) and of Datta (1899).

BHARS See **DIHARI**

BHARTIRHARI, b'hai'tiē-ha'rē (Skt *Bhartirhari*) The name of a San-krit author and legendary prince of India, whom tradition associates especially with Ujjain, the royal city of King Vikrama (qv). Bhartirhari's name is known to fame through a collection of 300 or more sententious stanzas, written in highly polished Sanskrit verse, with considerable rhythmic variety and comprised under the name of *Satakas*, centuries'. These *Satakas* are divided into three more or less precise hundreds, according to the manuscripts which contain them. The theme of the first 100 stanzas is Good Conduct, the *Niti-sataka*, in which the ethics of human life, rules for conduct and moral behavior are pithily presented in brief metrical proverbs or apt illustrations full of wise thought and Oriental picturesqueness. The second century is devoted to aphorisms on the Passion of Love, the *Śṛṅgāra sataka*. The third century, or *Vaiśiṣṭya-sataka*, deals with Renunciation, the abandonment of worldly desires and pleasures, which are mere vanity.

The question how far these aphoristic sayings, or proverbial wisdom in verse, are directly to be attributed to Bhartirhari as author, or whether the collection may not be regarded as a mere series of apothegms and wise saws drawn from various sources and attached to his name, is a point that has been much discussed. In spite of the fact that a number of the stanzas are found in works ascribed to other authors, the tendency nowadays is to favor the native tradition which upholds Bhartirhari as author of most of these poetical stanzas, so rich in philosophic judgment and sound common sense.

The second point, as to Bhartirhari's personality, whether he was a king, and what may have been his era, has been much debated. According to tradition he actually was King of Ujjain, and elder brother of the renowned Vikramaditya. He is said to have abdicated the throne, after a reign of seven years as an indolent and licentious monarch, in favor of his brother because his life was ruined owing to the infidelity of his favorite wife (compare the traditional interpretation of *Niti-sataka*, 2), and he is reported to have withdrawn from the world, although after long hesitation, to pursue the existence of an ascetic. The inquiring visitor at Ujjain will yet be shown the kingly poet's hermit grave and still will hear numerous legends recounted about Bhartirhari's life. A statement of the Chinese traveler I-Tsang, who visited India in the seventh century of our era, would place the date of Bhartirhari's death at 651 A.D., although native tradition would claim that he lived several hundred years earlier. The same Chinese authority likewise recognizes him as the composer of a grammatical treatise, the *Vakropanaditya*, although its authenticity has been doubted by some Hindu scholars. In such matters it may be well to suspend judgment until more material be gathered, and in all cases due weight must be given to the native tradition. For the present we may be safe in

accepting Bhartirhari as a real personality, a philosophic poet of genuine merit, perhaps likewise as a grammarian, although this has been questioned, and probably also as one of royal estate, who may have been related to Vikrama of Ujjain.

From a literary standpoint the collection of Bhartirhari's *Sententious Wisdom* has real merit, and the stanzas have also the special interest that 200 of them were the first piece of translation from the Sanskrit known to have been published in any European tongue. This version appeared in a book by the Dutch missionary, Abraham Roger, *De Open Dewe tot het Verboigen Heydendom* (Leyden, 1651). Numerous editions, translations, and criticisms of Bhartirhari have since been issued. Consult especially, Purohit Gop-Nath, *Bhartirhari*, edited with Hindi and English translations (Bombay, 1896), Kale and Gurjar, *Niti-sataka and Vaiśiṣṭya-sataka*, edited with notes and an English translation (Bombay, 1898), Trimbak, *Bhartirhari's Niti- and Vaiśiṣṭya-satakas*, Bombay Sanskrit Series (1874), a complete edition of the three *Satakas*, with the native Sanskrit commentary in the Nirṇaya-Sagara Press Series (Bombay, 1892), Von Bohlen, *Bhartirhari Sententiae* (Berlin, 1833), and the same writer's German translation, *Die Sprüche des Bhartirharis* (Hamburg, 1835), Regnaud, *Les stances érotiques, morales et religieuses de Bhartirhari* (Paris, 1875), Tawney, *Two Centuries of Bhartirhari* (London, 1877), Wortham, *Translation of the Satakas of Bhartirhari* (London, 1886), More, *A Century of Indian Epigrams, Chiefly from the Sanskrit of Bhartirhari* (Boston and New York, 1898), Takakusu, *A Record of the Buddhist Religion by I-Tsang* (Oxford, 1898), Pizzi, *Bhartirhari Le Sentenze* (Turin, 1899), L. H. Gray, *The Metres of Bhartirhari* (New Haven, 1899), Kennedy, *Bhartirhari, the Satakas or Wise Sayings* (London, 1913), Pavolini, *Poeti d'amore nell' India* (Florence, 1900), and an edition of the *Vākya-padīya* in the Benares Sanskrit Series, ed. Griffith and Tibbaut (1892).

BHASKARA ACHARYA, b'has'kā-ra a-cha'rya (Bhaskara the Learned, Skt *ācārya*, teacher), born in 1114. One of the best known of the Hindu mathematicians. He was the sixth successor of Brahmagupta, at the head of the college of astronomers of Ujjain. Of his great work, the *Siddhāntasūyamani* ('Crowning of the System'), only three chapters have been translated, the first two, viz, the *Lilavati* and the *Bija Ganita* (treating of arithmetic and algebra), by Colebrook in 1817, the third chapter treats of the sphere. He also wrote the *Karanakutāhala*, as well as mathematical treatises. The *Siddhāntasūyamani* has been edited by Wilkinson (Calcutta, 1842) and Bapu Gastri (ib., 1866), and the *Karanakutāhala* by Divred (Benares, 1881). Following the Hindu custom, Bhaskara wrote in verse, but, unlike his predecessors, he added explanations in prose.

BHATTI, b'hat'tiē. A poet of India, to be assigned probably to the sixth century A.D., and sometimes identified with Bhartirhari (qv). He wrote the *Bhāṭṭakāvya*, an artificial epic celebrating the deeds of Rāma and very skillfully constructed for the purpose of illustrating grammatical and rhetorical rules. The *Bhāṭṭakāvya* was first published at Calcutta in 1828. The best edition is that of Divred (2 vols., Bombay, 1898). An edition of the first five cantos was

refaced with an English version by Kale (ib, 897), and the last five were translated into German by Schütz (Bielfeld, 1837). Consult *Index, Literary History of India* (London, 907).

BHATTIAS, b'hat'té-az, or **BHATNIAR**, b'hat'né ar. A name applied to the natives of the Issar district and the adjacent country in the Punjab. The population is composite, the higher classes, who established themselves in the country about the fourth century of our era, are Rajputs, the lower (agriculturists and cattle breeders) are Jats, who are said to have some Mongolian blood in their veins. The latter, although they have by imitation adopted the Islamic religion of the Rajputs, retain many primitive features of their older heathenism, while their language is less Aryan than the tongue of their supplanted. Some of the Sikh chiefs are of Bhattia origin, and the mother of Feroz Shah, one of the emperors of Delhi, is said to have been a Bhattia. Consult vol. II of Crooke's *Tribes and Castes of the Northwestern Provinces and India* (Calcutta, 1896) and the *Census Reports of the Indian Government* for 1902 and 1903.

BHAVABHUTI, b'ha'va-b'hoō'té. A noted Sanskrit dramatist, who shares with Sudraka, Kalidasa, and Harsha (qv) the honors of the early Hindu stage. He flourished during the latter part of the seventh century A.D. and the beginning of the eighth century. It is judged from his writings that he was a native of south Central India, it is also presumed that part of his life was spent at the city of Ujjain. Three dramas, all of recognized merit, preserve Bhavabhuti's name to fame. The first is the *Mālatī-mādhava*, sometimes called the *Hindu Romeo and Juliet*, the second is entitled *Mahā-nā-chaṛita*, or the fortunes of the great hero Rama, the third, *Uttara-nāma-chaṛita*, the later fortunes of Rama, is a sequel to the second. Here is an edition of the *Mālatī-mādhava* by A. R. Telang (Bombay, 1892), a translation by I. H. Wilson, *Theatre of the Hindus* (3d ed., London, 1871), and by L. Fritz (Leipzig, 1883, Teichm Series), furthermore, *Mahā-nā-chaṛita*, edited by J. H. Pritchett (London, 1848), a translation by J. P. Pickford (2d ed., London, 1892), and *Uttara-nāma-chaṛita*, edited by S. G. Bhambhani (Bombay, 1891), by V. S. Patwardhan (Nagpur, 1895), by T. R. R. Aiyar and K. P. Narayana (Bombay, 1899), translated by C. H. Winternitz (Calcutta, 1874). Consult Lévi, *Le théâtre indien* (Paris, 1890), and Schuyler, *Bibliography of the Sanskrit Drama* (New York, 1906), Frazer, *Literary History of India* (London, 1907), Harnitz, *The Indian Theatre, a brief survey of the Sanskrit Drama* (London, 1912).

BHAWALPUR, b'ha'wāl-poor'. See BAHAWALPUR.

BHEL (bél) **FRUIT**. See *FRUIT*. **BHEL**, bél, or **BHEEL**. Literally, 'boarman' is the name of a Kolarian or Mundra people of central India, in the Vindhya Hills, and to the south of the river Nerbudda, toward Bombay they are the remnant of an autochthonous race of peopled Rajputana and Malwa before theryan invasion and number now about 1,250,000, their language belongs to the Kolarian stock of Indian tongues, but many of them speak a corrupt form of the Aryan Gujarati. In Sanskrit literature their name is mentioned with disdain. They are short, dark-skinned, and have some traces of Aryan and perhaps also of

Dravidian blood. The English, to whom they remained faithful during the Sepoy Mutiny, have made some use of them as soldiers and policemen, and they have latterly paid a little attention to agriculture. A feature of their religion is the worship of Mother Amba Bhavani. Among some of them a harmless relic of widow-burning survives, also tree marriage, and other quaint customs. In some of the states of Rajputana, whenever a Rajput chief ascends the throne, a necessary part of the ceremony is marking his brow with blood drawn from the thumb or toe of a Bhl—this is a recognition of the claim of the Bhlis to former sovereignty in the land. The hill Bhlis, in particular, are noted for their belief in witchcraft and magic. An account of the Bhlis, by Kincaid, appeared in the *Journal of the Anthropological Institute* (London, 1879). Consult also Rowney, *Wild Tribes of India* (London, 1882), Reclus, *Primitive Folk* (New York, 1891), Crooke, *Natives of Northern India* (London, 1907), and other works.

BHIMA, bē'ma, **BEEMAH**, or **BIMAH**. A river of India, a branch of the Kistna (qv), rising in the table-land of the Poona District, in the presidency of Bombay, at an elevation of 3090 feet above the level of the sea (Map India, C 5). It flows in a southeasterly direction and falls into the Kistna, in lat 16° 24' N, long 77° 20' E, after a course of more than 400 miles.

BHIWANA, bē-wa'na. A town of British India, in the district of Ilissai, Punjab, 55 miles west of Delhi (Map India, C 3). It has a considerable trade in metals, sugar, spices, and salt, and is the chief trading center of the district. Pop, 1901, 35,917, 1911, 31,100.

BHOPAL, bō-pal', or -pal' (*Bhoj*, its founder + Hind *pal*, dam). The capital of the British political agency and of the native state of the same name, Central India (Map India, C 4). Pop, 1901, 77,000, 1911, 56,000. It is surrounded by a dilapidated stone wall, about 2 miles in extent. The fort, which is the residence of the Nawab, stands on a huge rock outside the town. Other interesting buildings comprise the Begum's palace, two mosques, the arsenal, and the mint. The town is clean, has fine promenade gardens, is well lighted, and owns and operates its own water works which utilize two immense tanks in the immediate neighborhood—one being 2 miles in length, and the other measuring 4½ miles by 1½. Each sends forth a river, and most probably both were formed by the embanking and damming up of their respective streams.

BHOPAL. A territory and British political agency of Central India, situated within the basins of the Ganges and the Nerbudda, in lat 22° 32' to 23° 16' N and long 76° 25' to 78° 50' E. It comprises 31 native administrations, including the native state, and is under the immediate superintendence of the government. Area, 11,653 square miles, pop, 1901, 1,157,697, 1911, 1,375,117.

BHUJ, bōoj, or **BHOOS** (named after its founder, Bhuj or Bhoj). The capital of the native state of Kach, India, situated at the foot of a fortified hill of the same name, in lat 23° 15' N and long 69° 44' E, about 35 miles from the sea (Map India, A 4). Its mosques and pagodas, interspersed with plantations of dates, give to the town an imposing appearance from a distance. A temple dedicated to the cobra de

capello is an interesting feature Bhuj is celebrated for its manufactures of gold and silver articles Pop, 1901, 26,362, 1911, 21,579

BHUMIJ, bū-mēj' One of the more important of the Kolarian, Munda-speaking tribes of Bengal See KOLARIAN

BHURTPORE See BHARTPUR

BHUTAN, bu-tan' An independent state of India, situated on the southern slopes of the eastern Himalayas (Map India, F 3) It is bounded on the south by Bengal, on the north and east by Tibet, and on the west by Sikkim The area is estimated at 16,800 square miles, and the population at 250,000, though perhaps the latter figure is too high Several of the mountain peaks exceed 20,000 feet, and the height of one is stated at 24,737 The climate varies with the elevation, and extremes of heat and cold may be experienced in a day's journey Some portions of the territory are fertile, and produce corn, rice, wheat, buckwheat, mustard, and cardamoms Cattle and considerable numbers of a peculiar breed of ponies are raised The manufactures, which are primitive and intended for home consumption, include coarse blankets and cotton cloth, swords, daggers, and other weapons, and agricultural implements The Bhotias are a hardy and vigorous race, of Tibetan stock, and their language, which is subject to great local variations, is a dialect of Tibetan They profess to be Buddhists, but their religion, like that of Tibet, partakes largely of the old Bon-po, which preceded Buddhism and consists chiefly of devil worship and propitiatory sacrifice The administration of the state is divided between the secular Deb raja, who in theory is elected for a term of three years by the *penlops*, or magnates, from their midst (in reality the nominee of the predominating chieftains), and the Dharma raja, the presumed reincarnation of Buddha, who is supposed to interest himself solely with the spiritual control of the state The winter capital is Punaka, or Dosen, a strong natural fortress 96 miles east-northeast of Darjeeling, Thashichedzong is the summer capital Bhutan formerly included considerable tracts of territory now included in Bengal and Assam, which were annexed in 1864 and 1866 by the British government in retaliation for outrages committed by the natives In 1805 the Bhotias drove the English out of Dewangiri, and a punitive expedition was sent against them A treaty concluded with the Bhutan government provided for the payment by the Indian government of an annual subsidy in return for formal cession of the annexed territory This subsidy began at £2500 and was gradually increased to £3333, it is conditional upon the maintenance of peaceful relations

BIATRA, bé-a'fra, BIGHT OF An inlet of the Gulf of Guinea (qv) (Map Africa, E 4) The name is usually applied to that portion of the Gulf of Guinea which extends along the western coast of Africa and borders the German possession of Kamerun Its width is about 100 miles The island of Fernando Po lies just off the Kamerun coast, and Prince's Island lies in the broad entrance to the bight The bight of Biafra is often confounded with the Gulf of Guinea, but care should be taken to restrict the appellation to the bay facing the Kamerun coast

BIALYSTOK, byal'l'stók', or BIELOSTOK, byé'ló-stók' A garrison town in the govern-

ment of Grodno, West Russia, on the Bialy, a tributary of the Narew, 45 miles southwest of Grodno (Map Russia, B 4) Bialystok has several churches and a municipal palace and park It has manufactures of woolen goods, leather, hats, soap, silk, etc Pop, 1892, 62,626, 1908, 80,190 The town was founded in 1320 and became part of Russia after the third partition of Poland On June 14-16, 1906, there was a massacre of Jewish inhabitants by the mob aided by the police and the military See RUSSIA

BIANCA, It pron byan'ka 1 In Shakespeare's *Taming of the Shrew*, the younger sister of Katharine 2 In Shakespeare's *Othello*, a flame of Cassio 3 The heroine of Massinger and Fletcher's *Fair Maid of the Inn* 4 In Dean Milman's *Picco*, the wife of Fazio

BIANCAVILLA, byan'ka-vil'la (It *bianca*, white + *villa*, town) A city in Sicily, on the southwest slope of Mount Etna, 20 miles northwest of Catania (Map Italy, K 10) The streets are paved with lava, and in the vicinity are the basaltic grotto of Scilla and the grotto of the Aichi in the lava of 1607, with a tunnel half a mile long at the height of nearly 7000 feet The country produces wine and grain, and the cotton from all this part of Sicily bears the name of Biancavilla The town was founded as an Albanian colony in 1480 Pop, 1881, 13,319, 1901, 13,358, 1911, 16,231

BIANCHI, byan'ke (It the Whites, pl of *bianco*, cf Eng *blank*) A political party in Florence at the beginning of the fourteenth century They were originally one of two conflicting branches of a great family in Pistoia Both parties, Whites and Blacks, being banished to Florence, allied themselves with existing factions there, the Bianchi with the Cerchi family and the Neri with the Donati, and gave their names to the Florentine parties The Neri triumphed in 1301 by the help of Charles of Valois, and the chief men of the Bianchi, including Dante, were banished The name was also applied to certain religious fanatics and vagabonds in Italy about the year 1400, and at the present time it is popularly given in Rome to the supporters of the Italian monarchy

BIANCHI, NICOMEDE (1818-86) An Italian historian, born at Reggio He studied medicine and during the Revolution of 1848 was a member of the provisional government of Modena and Reggio He became professor of history and geography in the naval college at Nice, then professor of history at Turin, and in 1871 superintendent of the archives of Piedmont His most important works are the *Storia documentata della diplomazia europea in Italia dal 1814 al 1861* (8 vols, Turin, 1865-72), an immense repository of imprinted documents, *Storia della monarchia piemontese dal 1773 al 1861* (4 vols, Rome, 1877-85), both written in an interesting style and carefully prepared from original sources, and *Il conte Camillo di Carcar* (5th ed, 1863) Consult De Jubernatis, *Dizionario biografico degli scrittori contemporanei* (1880), and *Rivista storica italiana* (1886)

BIANCHI-FERRARI, -fai-ra'rè, FRANCESCO DE', called IL FRATE (1400-1510) An Italian painter of the early Renaissance, belonging to the Emilian school He was born at Ferrara, was probably a pupil of Sosimo Tura and a follower of Ercole Roberti, and was active chiefly at Modena, in the museums and churches of which city most of his paintings are He was of

mediocre ability. He was reputed to have been the teacher of Correggio.

BIANCHI-GIOVINI, byan'ké jô-vè'ne, ANCIOTO, commonly called AURELIO (1799-1862). An Italian historian and publicist, born at Como. He was at first a journalist in Switzerland. In 1830 he became editor of the *Aurora*, a Swiss political journal, and five years later of the *Repubblicano della Svizzera italiana*. In 1841-47 he wrote a number of historical works in Milan, and in 1848-52 edited the *Opinione*, a Unionist journal, in Turin. During that time he was a member of the Chamber of Deputies. In 1853 he established *L'Unione*, which he transferred in 1861 to Milan and in 1862 he founded at Naples, *La Patria*. His chief works are the *Biografia di fra Paolo Sarpi* (1834), an incomplete *Storia dei Papi* (12 vols., 1850-64), *L'Istoria in Italia* (2 vols., 1854). Consult the biography of Montazio (Turin, 1862).

BIANCHINI, bô-an'kê'nê, FRANCESCO (1662-1729). An Italian antiquarian and astronomer. He was born at Verona. He studied theology, jurisprudence, languages, the mathematical sciences, and botany in Padua, and archeology in Rome, and was appointed by Clement XI secretary to the commission for reforming the calendar. Later he traveled through France, Holland, and England. Bianchini is the author of several memoirs and dissertations on antiquarian and astronomical subjects, and of *Istoria universale porata co' monumenti, e figurata co' simboli degli antichi* (Rome, 1697). An edition of the work of Anastasius, *De Vitis Romanorum Pontificum*, begun by him, was completed by his nephew Giuseppe Bianchini (4 vols., Rome, 1718-34). His nephew also edited his *Astronomica et Geographica Observationes Selectae* (Verona, 1737). A monument was erected to the memory of Francesco Bianchini in the cathedral of Verona.

BIANCO, by-an'kô, ANDREA. An Italian cartographer, active at Venice in the early fifteenth century. Among his charts is one dated 1436, in which he has indicated two islands, called respectively "Antilla" and "De Laman Satanaxio," at the west of the Azores. It has been asserted by some that he thus reveals a knowledge of North and South America. His maps are valued for showing the progress of navigation up to that time, indicating knowledge of the Azores, Madeira, and Canary Islands, exhibiting some notion of the Baltic and Germanic coasts, and sketching an outline of the Mediterranean shores, relatively exact for the period.

BIANDRATA, GIORGIO. See BLANDRATA.

BIARD, byâr. The name of several French Renaissance artists.—NICOLAS BIARD (1460?-?) was one of the architects of the Chateau of Amboise (1499), of the Pont Notre Dame (1499), of the Chateau of Blois (1500-04) and Gaillon (1505-06), and of the tower of the cathedral of Bourges (1508).—PIERRE BIARD (1559-1609). A sculptor, architect, painter, and engraver, who studied in Italy and became a follower of Michelangelo. On his return to Paris he was made royal superintendent of buildings in 1590, in 1600 he executed the magnificent choir screen of St Etienne du Mont, then decorated the Hôtel de Ville with a bronze statue of Henry IV (1605), and the Louvre with statues of two slaves and of "Renown."—His son, PIERRE BIARD, succeeded him as sculptor to the King (Louis XIII).

BIARD, AUGUSTE FRANÇOIS (1798-1882). A French genre and portrait painter. He was born in Lyons, Oct 8, 1798. He was at first destined for the Church, but subsequently educated under Revoil at the school of art of his native city. He traveled in early life in Malta, Cyprus, Syria, and Egypt, where he made sketches and stored his memory with images which he used in after years. In 1839 he visited Greenland and Spitzbergen, and of this journey one of the fruits was his famous picture of a battle with polar bears. In 1858-59 he traveled in Brazil. At the court of Louis Philippe he was very popular as a portrait painter. More famous than Biard's ethnographic and historical paintings are his genre pictures, especially those dealing with comic subjects. The first picture which gained him distinction was his "Babes in the Wood" (1828), and one of his best is the "Beggars' Family," exhibited in 1836. His picture "Strolling Comedians" is in the Luxembourg. Many continental galleries possess examples of Biard's pictures, and in England they were formerly much sought after. Though conscientiously drawn, they are hard and dry in color and of little value as paintings. Consult Goffin, *The Story of French Painting* (New York, 1911).

BIARD, PETER (1565-1622). A French missionary, born in Grenoble. He began to study theology at the age of nine years, in Lyons, and came to America as one of the first two missionary priests sent to New France, arriving at Port Royal on the day of Pentecost, 1611. On June 10, 1611, Biard and his associate, Ennemond Mascé, wrote the first letters ever sent by the Jesuit Order from the Canadian settlement. Soon afterward he began the study of the Indian language by questioning the natives on the meaning of the words *faith, hope, charity, baptism, sacrament, trinity, eucharist, and incarnation*, a study rendered extremely difficult by the unwillingness or the inability of the natives to reply, and by the ridicule and severity which his questions frequently encountered. In 1612 he ascended the Kennebec River and established friendly relations with the Indians, and in 1613 he proceeded as far as the Penobscot and founded a colony on Mount Desert Island, which he hoped to make a permanent settlement. The little hamlet was, however, shortly afterward destroyed by an English force under Samuel Argall, Deputy Governor of Virginia. One of Biard's followers was killed, and he himself was taken prisoner and transported to England. This attack is memorable as resulting in the first actual hostilities between the French and English settlers in America. At the instance of the French Ambassador, Biard was subsequently liberated and returned to Lyons, where, in 1616, he published his *Relation de la Nouvelle France, et du voyage des pères Jésuites dans cette contrée*, the first of that remarkable series of *Jesuit Relations* (10 vols., 1632-72), which constitute one of the most valuable sources of early American history. Another important work is the *Relatio Expeditionis Anglorum in Canadam sursum ab illis Complicis suis*. The *Mission canadiennes* was published in 1870. Consult *Jesuit Relations*, Eng. trans., ed by Thwaites, vols. i-iv (Cleveland, 1896-97), Hughes, *History of Society of Jesus in North America* (Cleveland, 1908-10).

BIARRITZ, byâr'rêts' (Basque *Mairritz*, two rocks). A fashionable watering place in the department of Basses-Pyrénées, France, about 5

miles southwest of Bayonne (Map France, S. C 5) Napoleon III and Eugénie, attracted by its picturesque situation, natural advantages, and salubrity, made it their summer residence. Since then it has been a favorite place for invalids and pleasure seekers, both in summer and in winter. Its industries are of little importance, the town depending upon tourists' patronage for its prosperity. Pop, 1896, 11,869, 1901, 12,812, 1911, 18,200. Consult Laboude, *L'encore le vieux Biarritz* (Bayonne, 1909).

BIAS, bé'as See BE'S

BI'AS (Gk *Bías*) One of four men always classed among the Seven Sages (q.v.) of Greece (the others were Thales, Pittacus, and Solon). He was the son of Teutames, and was born at Priene, in Ionia, Asia Minor, where he became a distinguished advocate and influential citizen. His date is approximately the middle of the sixth century B.C. Many of the stories attached to the name of Bias—such as that he advised the Ionians to settle in Sardinia, at the time of the Persian invasion, and that he dissuaded Cræsus from attacking the Greek islands—have been characterized as of doubtful authenticity. Bias was successful at clothing his wisdom in short sayings, and we have a number of them preserved. Consult F. W. A. Mullach, *Fragmenta Philosophorum Græcorum*.

BIBACULUS See FURIUS, MARCUS FURIUS BIBACULUS

BIBB, GEORGE M. (1772-1859). An American legislator. He was born in Virginia and graduated at Princeton in 1792. He was several times elected Chief Justice of Kentucky and subsequently became Chancellor of the Court of Chancery. He was elected to succeed Henry Clay as United States Senator in 1811 and served until 1814 and again from 1829 to 1835. From 1844 until the inauguration of James K. Polk he served as Secretary of the Treasury in President Tyler's cabinet. He published *Reports of Cases at Common Law and in Chancery in the Kentucky Court of Appeals* (1808-11).

BIBBIENA, bé-byé'na, BERNARDO DOVIZIO or DIVIZIO DA (1470-1520). An Italian ecclesiastic and poet, born at Bibbiena (Arezzo). He was private secretary of Giovanni de' Medici, whose elevation as Pope Leo X. he helped to effect, and who appointed him a Cardinal and papal treasurer in 1513. He conducted successfully an ecclesiastical war against Urbino, and later (1518) was legate to France for the purpose of uniting Christian rulers against the Turks. It is reported by some authorities that he died of poisoning. He was a friend of Raphael, and wrote *La Calandria* (1521), generally accounted the earliest Italian comedy. It was modeled on the *Menachmus* of Plautus. He also translated several plays of Plautus which were played before the Pontifical court. For his biography, consult Bondini (Leighorn, 1878), Canonicini, *Nuovi profili letterari* (Milan, 1875), Graf, *La Calandria* (1878), Wendriner, *Die Quellen von Bernardo Dovizio Calandria* (1895), Flamm, *History of Italian Literature* (New York, 1906).

BIBELOT, bé'b'lot, or bib'lot (Fr.) A name given by collectors to any small ornament or article of taste that can be used to adorn the shelves or the cabinet of the owner, such as bronzes, bits of rare china or porcelain, and antiques.

BIBERACH, bé'be-rach (Ger *Biber*, beaver + Teut *aha*, water). A town of Württemberg,

situated 1750 feet above the sea on the Riss, in a charming valley about 23 miles southwest of Ulm (Map Germany, C 4). Still surrounded by walls and towers, the town has an appearance decidedly picturesque. It has manufactures of machinery, artificial flowers, leather, children's toys, and bell foundries, and its grain and fruit markets are famous. The town owns its water and gas works and has a high school, hospital, and theatre. Pop, 1890, 8200, 1900, 8400. Near Biberach, Oct. 2, 1796, Moreau won a great victory over the Austrian General Latour, and May 9, 1800, Saint-Cyr defeated the Austrian General Kray.

BIBESCO, bé-bés'kó, BARBO DEMETRIUS (1801-69). A Wallachian statesman. He studied in Paris in 1817-21, participated in the revolt of Alexander Ypsilanti, and was successively Minister of Justice and Minister of the Interior. As Hospodar of Wallachia, in 1849-56, he improved education and the finances, and worked for Rumanian unity.

BIBIRI, bé-be'rè, or **BIBIRU**, bé be'ro See GREENHEART

BIBLE. I.—IN GENERAL. 1 *Meaning of the Name*. The word "Bible" is derived from the Latin *biblia*, which was treated as a singular, although it represented the transcription of the Greek neuter plural βιβλία, *biblia*, 'little books,' which is used in 1 Maccabees xii. 9, in reference to the Scriptures. The Greek βιβλος, *biblos*, from which came the diminutive, was in turn derived from *bydlios* or papyrus, the name of the famous material upon which ancient books were written. The name in its singular form emphasizes the unity of the Bible, while in its original plural sense it calls attention to the fact that the Bible is a collection of many books. The title was first used in the Second Epistle of Clement (xiv. 2), written c. 170 A.D.

2 *Extent of the Collection*.—At the end of the second century A.D. the synagogue accepted as canonical 24 books. These were identical with the 39 in the English Bible. But the 12 Minor Prophets were regarded as one book, the books of Samuel, Kings, and Chronicles were not divided into two each, and Nehemiah was considered as a part of Ezra. The Hellenistic Jews, however, had in then canon a number of books in addition to these 24, and the Church received them as part of the Greek Bible. Among them were Judith, Tobit, 1 and 2 Maccabees, Baruch, the Epistle of Jeremy, Ecclesiasticus, and Wisdom of Solomon (See DEUTERO-CANONICAL BOOKS). There were also in the Greek Scriptures many other works, like the Psalter of Solomon, the Translation of Moses, the Testaments of the Twelve Patriarchs, and the apocalypses of Enoch, Baruch, and Ezra (See APOCRYPHA). Most of these were written originally in Hebrew or Aramaic, though some were composed in Greek. With the spread of Christianity they were translated into Latin, Coptic, Syriac, Ethiopic, old Slavonic, and other languages, and have in many instances survived only in these translations. The completest collection of these books will be found in Charles, *The Apocrypha and Pseudepigrapha of the Old Testament* (Oxford, 1913). The number of Old Testament books, therefore, varied greatly in different parts of the early Church. About 200 A.D. the 27 New Testament books found in the English Bible had won a very wide recognition. But in some parts of Christendom such *antilegomena* as 2 and 3 John, 2 Peter, Jude, and Revelation were not

regarded as canonical, and they are not found in the early Edessene Bible. On the other hand, not only early catalogues of biblical books, but also our earliest manuscripts of the Greek Bible contain books which at present are classed as Apostolic Fathers (q.v.) or New Testament Apocrypha. The most complete collection of the latter class is found in Hienneke, *Neutestamentliche Apocryphen* (1904). While their extent still varies in different parts of Christendom, there is a growing tendency to cherish as precious testimonies to the religious life in ancient Israel and in the early Church, and to make available for purposes of instruction and edification, all the books that were once read and revered as Scriptures.

3 *The Original Languages of the Bible* are Hebrew, Aramaic, and Hellenistic Greek. Hebrew, which was used by a majority of the Old Testament writers, is the Semitic language spoken by the inhabitants of Canaan, and adopted, if not originally employed by the Israelites, when they entered that territory. It is characterized by simple constructions and by the absence of the expressive conjunctions and particles which in the Greek make it possible to indicate delicate shades of logical or philosophical thought. On the other hand, its vocabulary and idioms are exceedingly picturesque. In the verb there are, strictly speaking, no tenses, but only modes discriminating between complete and incomplete action, while the different stems indicate simple, intensive, causative, reflexive, and passive action. Its simplicity, vividness, directness, and suggestiveness made it an excellent medium of expression for the storyteller, the poet, the orator, and the ethical teacher. Aramaic (incorrectly called Chaldean or Chaldæan, from the reference in Dan ii 4) was the Semitic dialect spoken originally by the Aramæans (q.v.). The reference in Isa xxxvi 11 indicates that as early as 700 B.C. it was the language of politics in southwestern Asia. From the days of the Babylonian exile it was used as the medium of communication between the Jews and other Semitic peoples, and gradually supplanted Hebrew even in Palestine. Aside from a few sporadic examples (cf. Gen. xxxi 47, Jer. x 11), it appears in the Old Testament only in Ezra iv 8 to vi 18, vii 12-26, Dan ii 4 to vii 28. The composite structure of these books explains its abrupt introduction into Hebrew contexts (See EZRA, DANTON). In Ezra the Aramaic sections represent quotations by the final editor from earlier Aramaic documents. Since his readers were entirely familiar with the Aramaic, he did not deem it necessary to translate these into the already classic tongue, which he preferred to employ. In Daniel, as well as Ezra, it is the Western or Palestinian Aramaic, rather than the form of the dialect in use in the East, which appears, suggesting that the originals were written in Palestine. Hellenistic Greek, the language of the New Testament, is the simplified dialect of Attic Greek, which was in use among the Semitic peoples, Hellenized as a result of the conquests of Alexander. By the beginning of the Christian Era it had become largely the literary language of Jews throughout the Roman Empire. As a consequence of its use by alien peoples, the complex verbal forms and constructions of classical Greek disappeared. Many characteristic Semitic idioms were carried over into the Greek, and its vocab-

ulary enlarged. The result was a simple, direct, expressive language, combining the picturesqueness and concreteness of the Hebrew with the larger and more scientific and philosophical vocabulary of the Greek. Thus the composite dialect used by the New Testament writers was well adapted to their purpose, and, by virtue of its simplicity and force, fitted to express ideas and sentiments that were destined to have an epoch-making influence in the world.

4 *The Bible, Viewed as Literature*, shares the general characteristics of the Oriental and more specifically of the Semitic group to which it belongs. The Occidental student, as in the Koran, feels at once the lack of systematic arrangement. The type of thought is intuitive rather than logical. Scientific method and interest are wanting. Instead, the religious motive is dominant. Concrete pictures and vivid figures are prominent in its prose as well as in its poetry. Almost every form of literature is represented in the Bible, from the war song, the lament, and the lyric, to the rhapsody and the philosophical dialogue (See JOB). Parables, fables, enigmas, proverbs, stories, biographies, epistles, orations, and prayers are all found in this great collection of books. Among the more specific characteristics of biblical literature may be noted its naturalness, its realism, the love of external nature which it reflects, as in the Psalms and Canticles, its practical optimism, which rests upon the recognition of a divine purpose for good realizing itself in all life, and its exalted moral tone. It is also characterized by a remarkable combination of realism and idealism.

Of the two Testaments, the Old undoubtedly contains more that deserves a place among the world's greatest literature. Certain portions of the Gospels, because of their simple directness and vividness, and certain of Paul's wonderful appeals and rhapsodies are accounted great, measured simply by literary canon, but as a rule, the New Testament writers gave little heed to form in their zeal to apply the principles of Christianity to the needs of human life. While the New Testament represents the writings of a religious body, the Old is the literature of a people. It abounds in passages and contains some books which are recognized as unsurpassed for their vigor or dramatic force, beauty, or grandeur. The literary merit of the different books varies greatly, since the Old Testament reflects the different stages in the literary history of Israel. The Song of Deborah, certain of the prophetic narratives, the oracles of Isaiah, the messages of inspiration and comfort in Isa. xl. to lv., certain of the Psalms, the Book of Job, the Book of Jonah and Canticles, represent some of the high-water marks of Hebrew literature.

5 *The Authorship* of the different parts of the Bible is a subject which has received the careful attention of scholars during the last century. Many Jewish and Christian traditions, hitherto accepted without question, have been abandoned in the light of the internal evidence from the books themselves. The Bible is to-day widely recognized as the work of a large number of prophets, priests, sages, psalmists, apostles, and editors, whose names are often unknown to us. Most of its books are regarded as composites, containing citations from earlier and later sources, joined together in their present form by copyists and editors who thus preserved them. The Book of Proverbs, for example,

probably embodies the crystallized experience of many wise men, living at different periods, and studying life from many different points of view. The Bible, therefore, is the expression of the many-sided experiences and revelations vouchsafed to the truth seekers and teachers of Israel. Most of them were intent only upon proclaiming the truth revealed to them, content themselves to sink into oblivion, if their aim were realized, hence a great majority of the writings of the Bible are anonymous.

6 *Periods Represented by the Bible*—Some of the earliest poems of the Old Testament go back to the days of the Judges, at least to 1200 B.C., and certain of the Psalms and the Book of Daniel are in all probability later than 200 B.C., so that its literature represents more than 1000 years. The oldest epistle of the New cannot be dated before 50 A.D., and the latest writing is probably not later than 150 A.D., so that the New Testament represents a brief century of literary activity. Supplemented by the later deuterio-canonical and apocryphal books, the Bible, as a whole, reflects some 14 centuries of literary production.

7 *The Subjects Treated in the Bible* are as varied as the literary forms. In the implied explanation, in connection with the story of man's fall, of the reason why serpents crawl in the dust, instead of being provided with legs, and in the accounts of creation, there is evident the questioning attitude toward natural phenomena which marks the beginning of scientific investigation, but otherwise more important themes commanded the attention of the biblical writers. Aside from the modern department of science, almost every phase of human life and thought was treated by them. Nothing that concerned man was beneath their attention. The prophetic literature is concerned with political, social, moral, and spiritual questions. Its aim is to present the character and will of God and the principles which govern His universe, and to lead humanity intelligently and faithfully to conform to them. The legal literature was intended to provide a norm to regulate the public and private life of the people, so that in attaining their best development they might also realize the divine purpose. The maxims and wise counsels of the sages were calculated to guide the inexperienced in their daily duties and throw light upon individual problems. The psalmists gave expression to the spiritual experiences and attitude of the nation and individual toward God. The epistles of the New, like the prophecies of the Old, contain warnings, exhortations, and illuminating teachings intended primarily to anticipate the needs of those to whom they were addressed, while the apocalypses, though differing widely from the preceding in form, were intended to convey similar messages of comfort and encouragement to those passing through great crises. The Gospels have the one dominant aim of presenting the life and teaching of the Founder of Christianity, and the Book of Acts, the influence of that life and teaching upon the Jewish and pagan world.

8 *Modern Methods of Biblical Study*—During the Middle Ages the traditions and conjectures of early Jewish and Christian teachers regarding the origin, date, and authority of the different books in the Bible satisfied the majority of students, since these were hallowed by age and continued indorsement of the Church

With the new interest in the Bible, inspired by the Renaissance and the Protestant Reformation, came a new spirit of investigation. Careful study of the Scriptures themselves sometimes confirmed, but more often revealed data at variance with the teaching of tradition. As scientific methods of historical and literary study were developed and proved trustworthy, they were adopted in dealing with the vital and often exceedingly complex problem presented by the Bible. That they should lead to conclusions different from those held in earlier ages was inevitable. The traditional views have at all times been upheld by scholars distinguished for their erudition as well as their sincere piety, both in the Roman Catholic and the Protestant churches, and the objections raised by them have often been of great value in testing the results, differentiating established fact from plausible conjecture, enriching our knowledge of the historical and archeological background, and preserving the sense of distinctive worth. But the advance toward the new positions is unmistakable. Their acceptance in the main seems assured, for they represent simply the testimony of the Bible itself, as revealed by methods of investigation which command universal confidence. The importance of the positive results of the critical study of the Bible is beginning to be popularly appreciated, and it is discovered that no essential truths contained in the Bible are lost, while its vital teachings are brought out into clearer relief. Reconstruction in the fields of biblical literature, history, and theology is going on rapidly, with the practical aim of providing a firm foundation for a religious faith which will meet the tests of a critical, scientific age. But the tentative character of many theories held even by a large majority of competent students should be borne in mind. Numerous problems still await a satisfactory solution which can be gained only by an increasing precision of the methods employed, and a gradual advance in our knowledge of the text itself as well as of history, archaeology, folklore, and comparative theology. The new methods and results are the contributions of no one country, church, or school. Germany was for a long time the leader, but eminent scholars in Switzerland, Austria, Italy, Holland, the Scandinavian countries, England, Scotland, and America have joined in the work of critical analysis and reconstruction. Valuable contributions have been made by Roman Catholic scholars as well as by critical students in all the leading Protestant denominations, by Jews, and by theologians, unaffiliated with any religious organization. Various schools of thought have labored from their own distinctive points of view, some more conservative, others more radical, thus securing scientific caution as well as progress. This wide cooperation has tended to give stability to the results obtained.

9 *The Positive Results of Modern Biblical Research* can here be presented only in barest outline. Through the discovery of new manuscripts, great advances have been made in the recovery of the original texts. In the field of literary criticism effort has been centred upon ascertaining the authorship and approximate date of the individual sections and the structure of the different books, with the result that it is now possible to make at least an approximate chronological arrangement of all the literature of the Bible. A new appreciation of the

terary beauty of the Bible has also been roused. On the basis of the oldest sources, supplemented by extra-biblical contemporary information, the history of Israel, the life of Jesus, and the record of the early Christian Church have been restudied. On the same basis the faith of Israel, which reached its culmination in Christianity, is being traced. In every department of investigation the principle of growth and development from the simple to the higher, and with this the fact of the unity of all life and thought, find fullest illustration. With the demonstration that the Bible records actual facts and is the result of impulses and influences which still stir humanity, comes the deeper realization that it has a living, vital, eternal message for mankind.

II. HISTORY OF INTERPRETATION

Of the Old Testament among the Jews. The earliest Jewish commentaries upon selected passages of the Law are apparently found in the writings of Philo (c. 20 B.C. - 50 A.D.) and in the Mishna. Many of the facts that have led modern investigators to recognize the composite authorship and real character of the Pentateuch were already clearly perceived by the Alexandrian philosopher. But by adopting the allegorical method of interpretation then in vogue among rhetoricians he was able to avoid the most obvious inferences and to read into the text his own philosophy. In this he no doubt did predecessors, but it was his work that became epoch-making in its influence upon Jewish aggada, Christian dogma, and Greek philosophy.

On the other hand, the Mishna largely confined itself to the "Halakha," or the rules of conduct authoritatively deduced from the Law. Among its leading interpreters were Hillel and Shammai (first century B.C.), the Gamaliels and Johanan ben Zakcai (first century A.D.). In such Mishnaic works as Mekilta (to Exodus), Sifra to Leviticus), and Sifra (to Numbers and Deuteronomy), likewise written in Neo-Hebraic, the "Haggada," or homiletic exegesis, had a wider field, and the same is true of the Aramaic paraphrases, or Targums. While the two Aramaic *gemasas* are primarily commentaries upon the Mishna, a vast number of passages from all parts of the Bible are introduced and explained in the discussion. The chief amoraic authorities of the Palestinian Talmud are Chya (died c. 230) and Johanan ben Nappacha (died 79), the most eminent exegeses of the Babylonian Talmud are Abba Arika, called Rab (died 247), Chisda (died 300), Ashi (died 427), and Rabina (died 499) of Sura, Samuel (died 37) and Amemar (died 422) of Nehardea, Abba ben Nachmani (died 330) and Abayi (died c. 339) of Pumbedita, and Raba (died 352) of Machuza.

An inestimable aid to the understanding of the Bible was rendered by the scholars who in the eighth century devised systems of vowel notation to preserve the traditional reading of the text. In the same century the Karaites, under the influence of Mohammedan thought, rejected the "oral law," codified in the Mishna and the Talmuds, and fell back upon the Pentateuch itself. Extracts from the works of Nathan ben David (c. 700) and Benjamin ben Isaac Mahawandi (c. 800) render it probable that their lost commentaries were already characterized by that sober exegesis we find in the

writings of Jefet ben Ali (902-990), Aaron ben Joseph (c. 1300), and Aaron ben Elijah (died 1369). The reaction produced a wholesome effect. Without breaking with the historical development, rabbinical scholars began to vie with the Karaites in attention to grammar, lexicon, and literal sense. Eminent among these were Saadia ben Joseph al-Fayyumi (892-942), gaon, or president, of the academy at Sura, who wrote in Arabic translations, commentaries, and grammatical works, Jehudah ben Karish (c. 920), Menahem ben Sarak (c. 950), Jehudah Chayyug of Fez (c. 1000-50), the grammarian, and his younger contemporary, Jonah Abulwalid Marwan ibn Janah, the lexicographer, who was a bold and sagacious textual critic. In opposition to both Karaites and Rabbanites, Chirwawi al-Balki (fl. 875-900) pushed his independent criticism of the Bible itself, known to us partly through Saadia, partly, it would seem, through the Geniza fragments found by Schechter, and published in the *Jewish Quarterly Review*, pp. 345 ff. (1901). With the doubts and questions that occupied Chirwawi's mind, Solomon ben Isaac ("Rashi") of Troyes (1040-1105) had little sympathy. His commentaries, printed in the Rabbinic Bibles, are celebrated for their erudition rather than for any originality. But, according to Ibn Ezra, a Spanish rabbi, Isaac ben Josas, maintained that Genesis 31 was written at the time of Jehoshaphat, and Abraham ben Menahem of Toledo (1088-1167) himself, however cleverly he concealed his heresies, not only revealed his consciousness of the late origin of the vowel points, but also his grave doubts as to the Mosaic authorship of parts of the Pentateuch, and the authorship by Isaiah of the latter part of the book ascribed to him. More deeply influenced by Greek and Arabic philosophy was Moses ben Maimon, of Cordova (1135-1204). His Arabic work, *Dalalat al-hayy*, or "Guide of the Stranger," lays down homoeopathic principles akin to those of Al-Ghazali (died 1111) and Ibn Rushd (Averroes, died 1198), allowing the suppression of the literal sense in the interest, not of theology, but of a philosophical system. David Kameli, of Narbonne (died 1235), wrote commentaries that were particularly valuable because of his excellence as a grammarian. Tanchum of Jerusalem (c. 1250) also produced several commentaries. Levi ben Gerson (died 1370) gave special attention to archeology; his exegesis was much influenced by his philosophy. An original thinker was Chasdai Creska (c. 1410), who conceived of prophethood as within the domain of human power. Joseph Albo (died c. 1444) reflected in a profound manner on the element of divination in prophecy and its ethico-pedagogic value. They were influenced by Christian thought Isaac Abrabanel (died 1508) was perhaps the first Jewish exegete who could approach the historical books with the intelligence of a statesman, his personal experience and the sufferings of his people account for the intense Messianic hope nourished by and reflected in his interpretation of the prophets. The exegesis of Solomon ben Melek, of Fez (c. 1550), was largely philological, leaning heavily on D. Kameli. By his critical edition of the Bible and the Masora (1524-25) Jacob ben Chayim rendered a great service to biblical science. But the two great critics of the sixteenth century were Elijah ha-Levi (Elias Levita, 1472-1540), whose *Masoreth hamasoreth*

literary beauty of the Bible has also been aroused. On the basis of the oldest sources, supplemented by extra-biblical contemporary information, the history of Israel, the life of Jesus, and the record of the early Christian Church have been restudied. On the same basis the faith of Israel, which reached its culmination in Christianity, is being traced. In every department of investigation the principle of growth and development from the simple to the higher, and with this the fact of the unity of all life and thought, find fullest illustration. With the demonstration that the Bible records real facts and is the result of impulses and influences which still stir humanity, comes the deeper realization that it has a living, vital, eternal message for mankind.

II. HISTORY OF INTERPRETATION

Of the Old Testament among the Jews. The earliest Jewish commentaries upon selected passages of the Law are apparently found in the writings of Philo (c.20 B.C.-50 A.D.) and in the Mishna. Many of the facts that have led modern investigators to recognize the composite authorship and real character of the Pentateuch were already clearly perceived by the Alexandrian philosopher. But by adopting the allegorical method of interpretation then in vogue among rhetoricians he was able to avoid the most obvious inferences and to read into the text his own philosophy. In this he no doubt had predecessors; but it was his work that became epoch-making in its influence upon Jewish haggada, Christian dogma, and Greek Philosophy.

On the other hand, the Mishna largely confined itself to the "Halaka," or the rules of conduct authoritatively deduced from the Law. Among its leading interpreters were Hillel and Shammai (first century B.C.), the Gamaliels and Johanan ben Zakkai (first century A.D.). In such Midrash works as Mekilta (to Exodus), Sifra (to Leviticus), and Sifra (to Numbers and Deuteronomy), likewise written in Neo-Hebraic, the "Haggada," or homiletic exegesis, had a wider field; and the same is true of the Aramaic paraphrases, or Targums. While the two Aramaic *gemaras* are primarily commentaries upon the Mishna, a vast number of passages from all parts of the Bible are introduced and explained in the discussion. The chief amoraic authorities of the Palestinian Talmud are Chiya (died c.230) and Johanan ben Nappacha (died 279); the most eminent exegetes of the Babylonian Talmud are Abba Arika, called Rab (died 247), Chiada (died 309), Ashi (died 427), and Rabina (died 499) of Sura, Samuel (died 257) and Amemar (died 422) of Nehardea, Rabba ben Nachmani (died 330) and Abayi (died c.339) of Pumpedita, and Raba (died 352) of Machuza.

An inestimable aid to the understanding of the Bible was rendered by the scholars who in the eighth century devised systems of vowel notation to preserve the traditional reading of the text. In the same century the Karaites, under the influence of Mohammedan thought, rejected the "oral law," codified in the Mishna and the Talmuds, and fell back upon the Pentateuch itself. Extracts from the works of Anan ben David (c.700) and Benjamin ben Moses Mahawendi (c.800) render it probable that their lost commentaries were already characterized by that sober exegesis we find in the

writings of Jefet ben Ali (902-990), Aaron ben Joseph (c.1300), and Aaron ben Elijah (died 1369). The reaction produced a wholesome effect. Without breaking with the historical development, rabbinical scholars began to vie with the Karaites in attention to grammar, lexicon, and literal sense. Eminent among these were Saadia ben Joseph al Fayyumi (892-942), gaon, or president, of the academy at Sura, who wrote in Arabic translations, commentaries, and grammatical works; Jehudah ben Karish (c.920), Menahem ben Sarak (c.950), Jehudah Chayyug of Fez (c.1000-50), the grammarian, and his younger contemporary, Jonah Abulwalid Marwan ibn Janah, the lexicographer, who was a bold and sagacious textual critic. In opposition to both Karaites and Rabbanites, Chitwri al Balki (fl.875-900) pursued his independent criticism of the Bible itself, known to us partly through Saadia, partly, it would seem, through the Geniza fragments found by Schechter, and published in the *Jewish Quarterly Review*, pp. 345 ff. (1901). With the doubts and questions that occupied Chitwri's mind, Solomon ben Isaac ("Rashi") of Troyes (1040-1105) had little sympathy. His commentaries, printed in the Rabbinic Bibles, are celebrated for their erudition rather than for any originality. But, according to Ibn Ezra, a Spanish rabbi, Isaac ben Jasos, maintained that Gen. xxxvi. 31 ff. was written at the time of Jehoshaphat; and Abraham ben Meir ibn Ezra, of Toledo (1088-1167) himself, however cleverly he concealed his heresies, not only revealed his consciousness of the late origin of the vowel points, but also his grave doubts as to the Mosaic authorship of parts of the Pentateuch, and the authorship by Isaiah of the latter part of the book ascribed to him. More deeply influenced by Greek and Arabic philosophy was Moses ben Maimon, of Cordova (1135-1204). His Arabic work, *Dalalat al hahirin*, or 'Guide of the Erring,' lays down hermeneutical principles akin to those of Al Ghazali (died 1111) and Ibn Roshd (Averroes, died 1198), allowing the suppression of the literal sense in the interest, not of theology, but of a philosophical system. David Kamehi, of Narbonne (died 1235), wrote commentaries that were particularly valuable because of his excellence as a grammarian. Tanelum of Jerusalem (c.1250) also produced several commentaries. Levi ben Gerson (died 1370) gave special attention to archeology; his exegesis was much influenced by his philosophy. An original thinker was Chasadi Creska (c. 1410), who conceived of prophethood as within the domain of human power. Joseph Albo (died c.1444) reflected in a profound manner on the element of divination in prophecy and its ethico-pedagogic value. They were influenced by Christian thought. Isaac Abrahamel (died 1508) was perhaps the first Jewish exegete who could approach the historical books with the intelligence of a statesman; his personal experience and the sufferings of his people account for the intense Messianic hope nourished by and reflected in his interpretation of the prophets. The exegesis of Solomon ben Melek, of Fez (c. 1550), was largely philological, leaning heavily on D. Kamehi. By his critical edition of the Bible and the Masora (1524-25) Jacob ben Chayim rendered a great service to biblical science. But the two great critics of the sixteenth century were Elijah ha Levi (Elias Levita, 1472-1540), whose *Masoreth hamasoreth*

to necessitate a continued resort to allegorical methods. Of these Syrian schools, the school of Antioch was of further reaching and more lasting influence, making itself felt to a greater or less extent with such fathers as Chrysostom, Athanasius, and Cyril in the East, and Ambrose, Jerome, and Augustine in the West. This was largely due to its leader, Theodore of Mopsuestia, who has been termed the exegete of the ancient Church. Unfortunately, his opposition to Origen brought him under the ban of orthodoxy, which naturally served ultimately to restate Origen's extreme conception and exaggerated use of allegory in the interpretative work of the Church, where it remained dominant until the Reformation.

(B) *The Medieval Stage*, which may be divided into the following periods: (1) The post-Patristic, represented by Bede (died c 735), Alcuin (died 804), Rabanus Maurus (died 856), and Radbertus (died 865). (2) The Scholastic, represented by John Scotus Erigena (died 801), though in a certain sense he belongs to a much later age of thought, Anselm (died 1109), Abelard (died 1142), Peter Lombard (died c 1164), Aquinas (died 1274), and Occam (died 1347). (3) The pre-Reformation, represented by Nicolas Lyra (died 1340), Lorenzo Valla (died c 1465), Reuchlin (died 1522), and Erasmus (died 1536).

The first of these periods may be safely said to have made no very great contribution to scriptural study, though especially the commentaries of Rabanus Maurus are often of value in the elucidation of the literal sense. Its work was chiefly that of compilation from the Fathers, either in the way of excerpts from their writings or glosses on them, and to support the interests of the Catholic faith was its only object.

The second period differed from the first largely in its intellectual aggressiveness. The object of Scripture study was still the support of the Church's faith, but the work was no longer done by slavish citations of the Fathers, but by speculative reasoning. This change was brought about by the rise of free inquiry, over against which it became necessary to vindicate the faith. This method naturally resulted, when applied to the interpretation of Scripture, in a renewed discarding of the literal sense and a further extravagance of allegorizing.

But with the revival of learning in the third period there came not only a new stimulus to the spirit of inquiry, but a new power to the work of interpretation—a power which showed itself especially in its opening up to the interpreter of the original languages of Scripture, particularly Hebrew, and thus bringing him face to face with its actual words. This naturally brought into prominence the literal sense, emphasizing its importance and increasing thus its influence upon other possible senses. The rule of faith was indeed still the object of Scripture study, but the service which this study rendered to it came now to be based more upon the primary meaning which the original language conveyed, and this in turn led to a weakening of the authority which the rule of faith exercised over interpretation itself. It was, in fact, the beginning of a radical change in the underlying conception of the Church involved in the interpretative process.

(C) *The Reformation Stage*

(1) The Protestant period, represented particularly by Luther, 1483–1546, Melancthon, 1497–1560, and Calvin, 1509–64.

This change in the conception of the Church, begun in the previous period, attained its full issue as men of thought reached the position that it was not the Church which was to decide what Scripture should teach, but Scripture which was to determine what should be taught in the Church. The growth of this idea was helped on the one side by the deepening conviction of the Church's intellectual and moral inability to handle Scripture, and on the other side by the increasing scholarly and religious respect for the Scriptures themselves. The characteristic of the Reformation interpretation was thus its fundamental principle of the sole authority of Scripture in the things of faith.

Along with this change in the conception of the Church went a change in the conception of the inspiration of the Scriptures. They were still held to be inspired, but not in any mechanical or even verbal way. There was a unique qualification that Scripture writers were understood to possess which separated them from all others, so that even the Deutero-canonical books were no longer considered on the same level with the other books, but this qualification was not any magical power which rendered their words infallibly true. The Bible writers were simply illumined by the Spirit in their knowledge of spiritual things, being in the committing of that knowledge to writing subject to the ordinary laws of the human mind. In fact, it was felt that inspiration as a process was always present in the Church.

With such radical alteration of the fundamental judgments regarding Scripture and the Church underlying interpretation, there resulted naturally a complete change in the interpretative method. Not only was the literal sense held to be the primary sense to be considered, but a satisfactory interpretation of it was regarded as perfectly possible with the aid furnished by Scripture itself. In other words, Scripture was considered as its own interpreter, sufficient and complete in all matters pertaining to salvation. As a consequence, the determination of Scripture meaning devolved upon the individual student of Scripture, so that private judgment came to be not only a fact of criticism, but a right of religion.

At the same time, under the continued influence of scholarship, the study of the original languages and other helps was carried on, serving constantly to make the Scriptures clearer to the understanding, while, under the growth of religious fervor, the Scriptures themselves were studied for the aid they could give religious life, serving to make them increasingly impressive to the spiritual sense. The Spirit was recognized not only as having spoken to the writers of Scripture, but as continually speaking to those who come to Scripture in study or in meditation, and so the tendency asserted itself to refer all Scripture in its meaning to Christ, and emphasis was laid upon the need of faith in Christ and general spiritual illumination in order to understand the meaning which Scripture really conveyed.

This tendency to centre everything on Christ, however, naturally opened the way to a return to the old habit of allegory, while the tendency to interpret Scripture in the light of itself led to insistence upon what was called, in the Pauline phrase (Rom xii 5), "the proportion of faith." This idea of proportion was useful primarily in preventing the distortion of

single passages against their context or against the statements of Scripture as a whole, but it shifted its course most easily from the "faith" given by Scripture in its own teachings to that laid down by the teachings of the Church, and in so doing started the whole process of interpretation toward the baneful exaggerations of the scholasticism which followed upon this first period of the Reformation. It should be mentioned, however, that a freer though equally reverent attitude toward the Scriptures was taken by many Baptist teachers and other radicals in this period. Adhering to the doctrine of "the inner light" and a continuous revelation, they were opposed both to the principle of the sole authority of the Scriptures and that of justification by faith alone, which had so strongly influenced Luther's estimate and interpretation of the biblical books. Calistaedt (q.v.) began the scientific inquiry as to canonization; Chataillon introduced the modern interpretation of Canticles; Denek sought for the natural origin of the Christ conception; Tizano and others investigated the integrity and authorship of New Testament books.

(2) The period of the Counter-Reformation, represented by Cajetan, 1509-1534, Bellarmine, 1542-1621, Francis of Sales, 1567-1622, and Jansemus, 1585-1638.

Though the Roman communion did not change its conception of the Church's authoritative relation to interpretation, nor alter its idea of the plenary inspiration of the Scriptures, yet the humanism which had been so influential in bringing Protestantism to life had had its effect also within the Mother Church. In both churches it had emphasized the value of the sources of theology, yet, owing to the fact that with the Roman Catholic church the old belief in ecclesiastical authority and Scripture inspiration still obtained, it was natural, not only that while the Reformers went back for their sources to Augustine and Paul, the Roman Catholic scholars, without any conscious disregard for these earlier teachers, put the emphasis upon the teachings of Thomas Aquinas, but also that such revival of theological learning as their study of the sources brought about did not produce with the latter the same vital change in the methods of interpretation.

In fact, the merits of the Counter-Reformation, which should be freely and fully recognized, were in the purifying of the Church's organization and the spiritualizing of its life, more than in the liberalizing of its methods of interpretation. The decrees of the Council of Trent (1545-63) united ecclesiastical tradition to the Scriptures, including the Deutero-canonical books, as the authoritative sources of the Church's faith, and made the Church itself the sole expounder of the sense they should have. Yet the insistence upon the authority of the living Church in expounding and defining truth, together with the traditional emphasis on the value of the Latin Vulgate, had a tendency to give more freedom in dealing with the Hebrew and Greek text. The scientific impulses not only among the Jesuit Fathers and the Fathers of the Oratory, but also among the educated laity, were strong, and the modern interpretation of the Bible owes a heavy debt of gratitude to such men as Erasmus, Vives, Pereira, Masius, Bonfrère, Morin, and Richard Simon, "the father of introduction."

(3) The Post-Reformation period (a) The

subperiod of Protestant Scholasticism, represented by Gerhard, 1582-1637, J. G. Carpzovius, 1679-1767, and Calovius, died 1686.

It was natural that, having rejected the infallible authority of the papacy, the reformed churches should not only look around for another objective authority to take its place, which they found in the Scriptures, but that, having secured a political right to its peculiar doctrines, and being thus compelled to maintain them against the attacks of opposing Protestant theologians as well as against the teachings of Rome, they should come to make the authoritative Scripture an oracle to serve them in their needs, and so substitute for a scholarly interpretation of the Scriptures a dogmatic distorting of them.

This was the result produced by the Protestant scholasticism, which differed from the Catholic scholasticism of the Middle Ages in being less ingenuous. It professed to base its system only on the Scriptures, but in reality based it on the Scriptures as interpreted by the party creeds in the Church, so that the Scriptures became an armory of controversial proof texts without any recognized difference between the Old Testament and the New, or any understood idea of progress or development in revelation.

(b) The period of Rationalism, represented by Lessing, 1729-81, Michaelis, 1817-91, and Eichhorn, 1752-1827.

Such degeneration in the spirit and life of interpretation was not without protest on the part of those who held equal right to Reformation principles with those who were responsible for the degeneration. It was not, however, until the philosophical movement, which saw its beginning in Descartes and Spinoza, reached its full vigor in Lessing that this protest effected the revolution in interpretative method which is known as rationalism.

The underlying principle of this revolution was its insistence upon reason as the test of revelation and the judge of the meaning of Scripture, which was taken only in its literal sense. It was anti-supernatural in its bias and brought to ridicule the confessional dependence upon a mechanical inspiration by emphasizing the difficulties and discrepancies of Scripture. It emphasized the moral teachings of the Bible and pointed out its high literary qualities, but often sought in an unnatural manner for a natural explanation of the miracles recorded. It lacked historic sense, and its negative attitude led to a general skepticism. There was little in the Church to oppose this movement, since pietism and mysticism had spent their force, and scholarship was all arrayed on the critical side.

(D) *The Modern Stage*, represented by Semler, 1725-91, Schleiermacher, 1768-1834, Bauer, 1792-1860, Meyer, 1800-73, and Ritschl, 1822-89.

It was from scholarship, however, that the first impulse was to come toward the newer interpretation which characterizes the present day. Semler's interpretative work necessarily partook of the rationalistic spirit of his day, though it improved upon the rationalistic method. A more constructive force was needed and was largely supplied by Schleiermacher and his followers, whose attitude to Scripture was one which, in proportion as it rejected all idea of mechanical inspiration, emphasized the practical character of the divine message to the soul, and the results of whose Scripture study were seen not only in constructive work in the field of gos-

pel and apostolic history, but also in a profound quickening of the religious life of the time.

The philosophy of Hegel furnished the fundamental basis for that interpretation of the New Testament which characterized the Tübingen School of biblical criticism, the influence of which on Scripture interpretation in general was in its day well-nigh universal. A reaction set in through Ritschl, whose work had a tendency to show a disagreement of this philosophy of history, in many important respects, with the historical facts given in the New Testament record, and whose followers, in Scripture interpretation, returned practically to the spirit of Schleiermacher's position—that the Scriptures constitute a divine message to the soul. Involved in this position there was not only a denial of all mechanical inspiration, but of all objective authority as attaching to Scripture, and a conception of the Church, not as an ecclesiastical organization whose doctrines were to be proved by Scripture, but as a spiritual community whose religious consciousness interprets for itself the Scripture contents. At the same time, in spite of these spiritual conceptions of Scripture and the Church, the Ritschlian method of interpretation essentially emphasized the historical sense of Scripture to the exclusion of all hidden senses behind it. The extensive influence of Ritschlianism as a school of theology has had its effect upon interpretation, especially in its affirmation of the purely spiritual authority of the Scriptures and the spiritual relation to them of the Church. As a consequence the inspiration of the Scriptures has come quite widely to be considered as of the same kind as that of all religious literature, and the authority of its message as more and more distinctly of a purely spiritual nature. The general acceptance of the scientific doctrine of evolution has in the last generation affected all schools of interpretation, and the exegete recognizes that it is incumbent upon him to explain, as far as possible, the origin and development of every idea, sentiment, custom, and institution found in the Bible.

The principle which universally controls the present interpretative method, both in theory and in practice, is the one brought out by Semler at the beginning of this modern stage of the science, and increasingly dominant ever since—that to be interpreted rightly, and, in fact, to be interpreted at all, every part of the Bible must be considered not only in its literal, grammatical sense, but in the light of the historical surroundings in which it was written.

III THE CANON OF THE BIBLE

Canon of the Old Testament. The word "canon" is a Semitic loan word in Greek, meaning literally 'a rod or pole, a carpenter's rule', figuratively 'a model or standard', and in Alexandrian writers sometimes 'a list of classics.' It was used in the letter of Aristos (c 100 B.C.) to indicate the character of the Law, by the Gnostic Ptolemy (c 200 A.D.) to denote the authority of the sayings of Jesus, and by Athanasius in 367 A.D. to designate the collection of sacred books. In the churches, and probably already in the synagogues of Alexandria, volumes publicly read as sacred and inspired were termed "canonical," in distinction from esoteric or heretical writings withheld from public use. Among the Palestinian Jews such books were at first simply said to be "holy." But in the first

century A.D. the Pharisees maintained that holy books "made the hands unclean," and that consequently an ablution was necessary after contact with them. The Sadducees protested in vain against ascribing to them the same kind of sanctity that attached to heave-offerings and dead bodies. This new ritual naturally tended to fix the limits of the canon. In the case of each book used in the synagogue the question must be raised whether a washing was obligatory. Thus the freedom of introducing new books was necessarily curtailed, and doubts were suggested as to the fitness of some works that had been used.

As in the case of the New Testament, the finally established canon of the Hebrew Bible was the result of a critical process reducing the number of books approved for public reading. Many works that maintained their place in the Alexandrian canon, such as Ecclesiasticus, Judith, Tobit, Baruch, and 1 Maccabees, lost somewhat of the prestige they had when they were first translated from the Hebrew or Aramaic original. Books like the Jubilees, the Psalms of Solomon, the Apocalypses of Enoch, Noah, Baruch, Ezra, and others were crowded out of the synagogue. A sphere of antilegomena was created. Ezekiel, Esther, Canticles, Ecclesiastes, and probably also Daniel, were held by some not to "render the hands unclean," while others deemed them worthy of a place with the accepted writings. This criticism naturally sought likewise to free the text from all supposed later accretions. Thus various additions to Daniel, Esther, and other books were removed. The critical eye was not keen enough to perceive the numerous interpolations in Job, Jeremiah, and elsewhere, and the best guide, the earliest Greek version, was distrusted. But to this critical movement we owe the text, as well as the canon preserved in our manuscripts and editions of the Hebrew Bible.

At the end of the second century A.D. the canon recognized by most synagogues contained 24 books, divided into three parts, viz. (1) The Law, or the five books ascribed to Moses; (2) The Prophets, i.e. Joshua, Judges, Samuel, Kings, Jeremiah, Ezekiel, Isaiah, and the Twelve; and (3) The Writings, comprising Ruth, Psalms, Job, Proverbs, Ecclesiastes, Canticles, Lamentations, Daniel, Esther, Ezra, and Chronicles. These were not all placed on the same level. As the Law had been the first to acquire authority, so it remained at all times the highest authority, and all non-Mosaic books were looked upon in the light of a commentary on the Law, and classed together as *Gabbala*, or "tradition." Among these books, however, the collection of "Prophets" had been more sharply differentiated. In regard to Ezekiel the liberal policy had prevailed, but Daniel was no longer regarded as among the prophets. Ruth and Lamentations were counted as separate books belonging to the third collection, and Canticles, Ecclesiastes, and Esther were permitted to remain in this series. The three divisions evidently mark different degrees of estimation. Of this threefold canon we have no evidence earlier than *Baba bathra*, 13b, 14a (c 200 A.D.).

Toward the end of Domitian's reign the number of canonical books seems to have been reduced to 22 (Josephus, *Contra Apionem*, i 8, written c 95 A.D.), or 24 (Apocalypse of Ezra, xiv 44, 45), if Ruth and Lamentations were copied separately for convenience in use at the

festivals of Shabdoth and 9th Ab. It was natural that the tendency seen in the arrangement of the alphabetic Psalms should also lead to a similar division of the canon. If the number had been fixed as 24 at the so-called Synod of Yamma (c. 90 A.D.), Josephus is not likely to have changed it to 22. Since he counts 13 books as prophetic and 4 as poetic and didactic, it is clear that the attempt had not yet been made to reduce the prophetic collection to the number of 8. Daniel and Ezra were very popular prophets at that time. The reaction came later, as a consequence of Christian apologetics. In 2 Macc. 11:13 Judas Maccabeus is said to have founded a library consisting of "books concerning kings and prophets, the poems of David, and letters of kings concerning gifts." This "library" is not yet a canon, and the author is likely to have known as many "prophets" as Josephus recognized. Ben Sira's grandson, who wrote after 132 B.C., was familiar with "the prophets and the other writings," as well as with "The Law" (Eccles. 1:1 ff.), but what books he counted as "prophets" cannot be determined. The evidence seems to point to the second century A.D. as the period during which a prophetic canon of eight books was definitely fixed, and with it inevitably the third group.

The order of the Prophets and the Hagiographa prescribed in the Talmud represents neither the original order nor the finally prevailing arrangement. In earlier times each book was copied on a separate roll, and the synagogue reader had a certain freedom of choice in his selections. This apparently was still the case at the end of the first century A.D. (Luke iv 17, *Baba bathra*, 13b). It was when larger volumes were produced and a fixed order of the *haptas*, or sections read in the synagogue, had been established, that the question as to the proper succession arose. Chronological and practical considerations then naturally led to conflicting results. It is probable that the Greek version has preserved the earliest attempts to arrange the prophetic books chronologically, viz., the Twelve, Isaiah, Jeremiah, Ezekiel, Daniel. REGARDING the effect of the contexts upon the mind of the reader may, as *Baba bathra*, 14a, suggests, have been responsible for the order: Jeremiah, Ezekiel, Isaiah, the Twelve. Isaiah, Jeremiah, Ezekiel, and the Twelve was the order finally adopted. The order of the *haptas* as probably was not determined until after the prophetic canon had been reduced to its present form, leaving out Daniel. When Ruth was removed from Judges and Lamentations from Jeremiah, the former seems to have been made at first an introduction to the latter, and the latter was given its chronological place between the Solomonite writings and Daniel. Subsequently both were united with the antilegomena to form the Five Rolls (Canticles, Ruth, Lamentations, Ecclesiastes, Esther) read at certain festivals. Psalms, Proverbs, Job, Canticles, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, and Chronicles was the order ultimately prevailing.

The threefold canon of the second century A.D. reveals the gradual growth of the authority of the Hebrew Scriptures. The Covenant Code (Ex. xx 24-xxiii 33), generally supposed by scholars to have been proclaimed by the priesthood of some great Ephraimite sanctuary in the name of Moses, was naturally looked upon with reverence. Still greater authority, however, did the

Deuteronomic Code enjoy. This law, found in the temple in the eighteenth year of Josiah (2 Kings xxi 8), was likewise ascribed to Moses and enjoined upon Judah in 620 B.C. During the Chaldean and Persian periods it grew in importance as the common law of the people. The earlier codes and narratives, together with the annals of the kings, appear to have been subjected to a reduction in the spirit of this Deuteronomic law. But as the theocracy developed, the interest settled on the cult, and numerous regulations concerning sacrifices, rites, and taboos, legends, myths, and genealogical traditions were added. These priestly additions are regarded by many scholars as a separate work compiled in Babylonia, brought to Palestine by Ezra and proclaimed at a great assembly, described in Neh. vii-x, in 444 B.C. It is held by others, however, that they grew up at the sanctuary in Jerusalem, and that Ezra, or some one else, wrote in one book all the material recognized as Mosaic, to inculcate obedience to the law. Additions were probably made to the law even in later times, as the Greek version suggests. Gradually scribes began to feel a certain reluctance to write the further developments of the law. It is no doubt the Maccabean period that gave to the law that central position in the religious life of Israel which it has in the Psalms, and on which the Pharisaic party then began to lay such stress.

This national uprising also lifted the prophetic writings to new importance. The exile which realized the gloomy forebodings of the earlier prophets enhanced their reputation as foretellers of future events. But their words were understood as exhortation to obedience to the law, and consequently could not be given the same authority with the law itself. Joshua, Judges, Samuel, and Kings were plainly written with a didactic purpose to show the dangers of disobedience to the law. Hence they were regarded as "prophetic" books. The publication of Daniel, in 165 B.C., revived the interest in prophecy, and inspired not only imitators, but also editors, to whom we owe the books of Isaiah, Jeremiah, Ezekiel, and the Twelve, in their present form. Apocalyptic visions furnished enthusiasm for the Messianic movements. Disenchanted Judaism, to save its life, fell back upon the Law and the earlier Prophets.

The Psalter is regarded by many scholars as in the main a product of the Hasmonean age, whatever earlier elements may have found their way into its different collections. As it was ascribed to David and numerous hymns were supposed to refer to his greater Son, its influence in an era of Messianic hopes was by no means limited to the temple service. Associated with it as early as in the middle of the first century B.C. were the writings ascribed to Solomon. The attacks upon Canticles and Ecclesiastes, with a view to having them relegated to the limbo of the *genusim*, as unfit for public use, were frustrated. We owe the preservation of the precious love lyrics to an utterly impossible allegorical interpretation, and judicious interpolations saved from destruction the remnants, in Ecclesiastes, of a remarkable philosophy of disenchantment. The survival of Esther is probably due partly to the tenacity of the old ancestral cult, partly to the vindictive spirit prevalent in the people at the time when its canonicity was discussed.

There is no record of any book having ever

been added by a Jewish assembly to a previously existing canon. The history of the canon is a history of the criticism of the canon. Certain books of a religious nature were held in high honor. Their contents suggested a divine origin. Ancient Hebrew critics inquired whether the character of some of these books justified the traditional estimate, and in many instances were forced by their doctrine of inspiration to answer in the negative. Some of them were successfully impugned as works not possessing a sanctity rendering a ceremonial washing necessary after contact with them. Others were not eliminated, though strong efforts were made to withdraw them from public use. Among those that had been regarded as sacred, but had been rejected, some continued in certain circles to be quoted as Scripture, as Ben Sira in *Baba Kama*, 92 et al., or read in certain synagogues, as Baruch in the time of Origen (Euseb., *Hist.*, vi, 25), or copied in the Bible, as Enoch by the Jews of Ethiopia. Among the Hellenistic Jews a large number of these works were preserved and quoted as Scripture, and consequently formed a part of the Greek Bible the Church received from the Synagogue.

Canon of the New Testament. The history of the New Testament canon is the history of the New Testament writings viewed as an authoritative and closed collection. It inquires as to the estimation in which these writings were held by the Early Church, how and when they came to be collected, and the principles upon which and the date when the collection was closed.

(1) *The New Testament Writings in the Apostolic Age*.—During this period the New Testament books came into existence. They were, in the majority of cases, produced independently, with no special reference to each other, by various authors at different times, for the use of different communities or individuals. Each book began its career alone. The answer to the question how they came to be collected, united, and constituted the canon or rule for universal Christian faith and practice, is to be sought first in certain characteristics of the Apostolic age. Christianity was not at first a book religion. The teachings of Jesus were committed to his Apostles, to be reproduced and proclaimed and taught by them, orally, as the Gospel. The Gospel was authoritative, for it was the Gospel of God. Therefore the words of the Apostles, as the accredited teachers and exponents of the Gospel, were accorded the greatest weight. What was true of then spoken words was also true of what they wrote. Hence, when the Gospel took on a written form, whether in an epistle or in a narrative of the words and deeds of Jesus written by an Apostle or an intimate companion and fellow-worker with the Apostles, such writing was sure to be carefully preserved, often read, widely circulated, and highly honored. It was a natural result, untrammelled by any theories whatsoever. The evidence for this is abundant throughout the New Testament. Upon these two principles, the supreme authority of the Gospel itself, and the preeminent right of the Apostles and their intimate associates to teach it, the subsequent career of the New Testament books depended.

(2) *The Sub-Apostolic Age* (to about 140 A.D.) was an intensely practical period. It was a missionary age. The Christian documents

that remain from it only incidentally reveal the state of opinion as to the New Testament books. They do, however, afford us a glimpse into the condition of the Church in nearly all parts of the Roman world then covered by Christian activity. Everywhere there was the same high opinion of the (now dead) Apostles, as the authorized exponents of the faith. There was general uniformity as to the recognition of the supreme authority of the teachings of Jesus. These were naturally placed alongside of the Old Testament, which, nevertheless, continued to be the only generally recognized "Scripture." From the canonization of the words of Jesus contained in the Gospel narratives, it was but a step to the canonization of the Gospels themselves. But this step was not yet formally taken. Collections, more or less complete, of the Pauline Epistles were in the hands of the leading men in the churches of Antioch, Asia Minor, Greece, Rome, and other places. Quotations from the New Testament writings are numerous, but of a free, informal character, in but one instance introduced by the regular formula, "it is written." The Apocryphal Gospels from this period, as a rule, show large dependence on our canonical Gospels.

(3) *From 140-225 A.D.* the Church was engaged in a deadly struggle with foes within and without. Gnosticism threatened to annihilate the primitive Christian faith, while the Roman government put Christianity itself under the ban. The Church was called upon to defend its faith and its position. Hence the more important Christian literature of this period is controversial. From the writings of Justin Martyr, in Rome about 150, we learn that the memos of the Apostles, also called "Gospels," were in common use in the public Sunday services of the Christians, and that these writings, as having been written by the Apostles and their companions, were the main source of the Church's knowledge of the deeds and teachings of Jesus. Nevertheless Justin held no strict theory as to the canon of the four Gospels. The progress of thought in this respect was such that Irenaeus, 30 years later, speaks of the four Gospels as the four foundation pillars of the Church, declaring that the four creatures in Rev. iv 7 symbolized the same Gospels. In Irenaeus we also find the conception that the Gospels, though four in number, were of one Spirit. In writers between Justin and Irenaeus we see the same general high estimation of the Gospels and familiarity with their contents. In reference to the Epistles, especially those of Paul, we find that not only many collections were in existence, but that they were coordinated with the Gospels as a second and essential element in the documents of the New Dispensation, which were now being placed alongside of the Old Testament as belonging to the Church's authoritative Scriptures. The conflict with heresy simply accelerated and sharpened the thought of the Church in these respects. At the outset both heretics and orthodox appealed to the same early documents and traditions. But when heresy began to manipulate these documents, or to forge others as of equal value, or to explain them by fanciful interpretations, such men as Irenaeus, Tertullian, and Hippolytus protested, insisting that only those writings which the Church had always used and received as of apostolic origin were to be accepted as standard and authorita-

tive By 225 the principle of a New Testament alongside of the Old was pretty firmly established and generally adopted throughout the Church. The two great divisions of this New Testament were designated by the terms, almost universally used, "the Gospel" and "the Apostle," corresponding to the Law and the Prophets, and each division was considered inspired. The main elements in "the Apostle" part were the Epistles of Paul, 1 Peter, and 1 John. These were practically universally used. The Acts and the Apocalypse were also quite generally used. In respect to the other New Testament books, though they belonged to the collection in some localities, their use had not yet become universal. On the other hand, in some localities, certain early Christian books, such as 1 Clement, Epistle of Barnabas, and the Didache, were accorded canonical rank. In Rome the principle of apostolic origin was rigorously applied, in Alexandria the spirit was more liberal.

(4) *Period from 225-691 A.D.*—All that now remained was for the Church to come to some agreement as to the differences between the collections in use. As to Alexandria, the writings of Clement and Origen show that doubts as to 2 Peter and 2 and 3 John were freely expressed, while James and Jude were, apparently, not used. A later Alexandrian bishop, Dionysius (c. 250), rejected the Apocalypse. There was much discussion, also, as to the authorship of Hebrews. Finally, however, Athanasius, the great Bishop of Alexandria, in 307, decreed that the canon consisted of the 27 books now included in the New Testament. In the West the question of the disputed books, which there were Hebrews, James, Jude, and 2 Peter, was finally settled by the Council of Carthage in 307, which accepted them as canonical. Usage in Rome and Alexandria and Carthage thus became uniform. In the East, dominated by Antioch and Constantinople, it was long before the question was settled. Eusebius, about 325, had pointed out that seven books were "Antilegomena," i.e., spoken against (by some). Of these, Hebrews and James were generally used in the East. The others, 2 Peter, 2 and 3 John, Jude, and Revelation, were often either unknown or unacknowledged. These were also probably wanting in the earlier Syriac Bibles. Gradually the practice in the East became conformed to that in the West, until at the Council of 691, though not without some inconsistency, the canon of the West—i.e., our present New Testament canon—was recognized. The controversies of the Reformation times left the New Testament canon practically untouched, except in Baptist circles.

IV THE VERSIONS OF THE BIBLE

Versions in Ancient Languages I. *Greek.*

—(1) According to Aristobolus, Pseudo-Hecataeus, and Pseudo-Aristeas, there existed long before Ptolemy II Philadelphus (285-247 B.C.), a translation of the Jewish Law, with which the great legislators and philosophers of Greece became acquainted. While the general character of these writings and the evident desire to magnify Moses throw doubt upon the assertion, it may reflect the confused memory of some translation supplanted by the officially recognized version. If so, it is lost, except as it may have been incorporated in the latter.

(2) The origin of the most important Greek Vol. III —16

version is minutely described in the letter of Aristaeas to his brother, Philocrates. This document relates how Ptolemy II Philadelphus was persuaded by his librarian, Demetrius of Phalerum, to send an embassy to the high priest, Eleazar, with a request for a copy of the Jewish Law and six men from each tribe to translate it. Seventy-two men were dispatched to Alexandria with a copy written in golden letters. They were led to the island of Pharos, where in 72 days they produced a work that greatly delighted Philadelphus as well as the Jews.

The spurious character of this epistle was already recognized by John Louis Vives (1522), Joseph Scaliger (1609), and Richard Simon (1678), and fully demonstrated by Humphry Hody (1684). The author professes to be a Greek, while he manifestly is a Jew. He claims to be employed at the court of Ptolemy Philadelphus, while his ignorance of the King's reign and his familiarity with later conditions render it probable that he lived in the beginning of the first century B.C. His official documents are forgeries, his story is based on mythical and legendary motives, and while it throws light on the Ptolemaic dynasty, and in part on the earlier history of the Jews in Egypt, it can give no aid in determining the origin and date of the version. The name derived from this legend (Septuaginta et duo, Septuagint, LXXII, LXX) is misleading and is used by scholars, if at all, only because of its convenience.

The earliest undoubted external evidence is probably found in Eupolemus. This writer seems to have used a translation of Chronicles. He apparently wrote his *History of the Kings in Judaea* not long before Alexander Polyhistor, who died in 40 B.C. Demetrius, who likewise lived some years before Alexander Polyhistor, seems to have used the Greek Pentateuch. Two books give direct statements as to when and by whom they were translated. A colophon to Esther states that the "letter of Pharaï" or Purnim, by which probably the Book of Esther is meant, was brought to Egypt in the fourth year of the reign of Ptolemy and Cleopatra, by Dositheus and his son Ptolemy, having been translated in Jerusalem by Lysimachus, Ptolemy's son. The year meant is probably either 113 B.C., the fourth year of Ptolemy X Soter II (Lathyrus), or 48 B.C., the fourth of Ptolemy XIV and Cleopatra VII. But the statement itself is unreliable. Of greater value is the preface to Ecclesiasticus (q.v.), in which the grandson of Jesus Siracides refers to books that had already been translated, such as the Law, the Prophets, and some other works, and mentions that he came to Egypt in the thirty-eighth year of Euergetes, who must be Ptolemy IX. Euergetes II (Physcon), consequently in 132 B.C. He does not state how many years he had been in Egypt. The impression is that translations were the order of the day. Many valuable works had already been done into Greek, others remained untranslated. The Law, no doubt, was first translated. This may have been done already in the time of Ptolemy II Philadelphus, as many scholars think. The discovery of the Elephantine papyri (q.v.) has tended to enhance the probability of certain statements in the Aristaeas letter as to Jewish settlements in Egypt in earlier times, and render the ascription of the version to the age of Ptolemy II Philadelphus more plausible. Papyri from the reign of Ptolemy III Euergetes

getes (247-221) also mention a town called Samaria in the Fayum, as well as some Jewish settlers in Pseumis, and this King greatly favored the Jews in Alexandria. The version is likely to have grown out of the necessities of synagogue and temple rather than out of royal curiosity. It was an oral, and then a written, *targum*, or interpretation, accompanying the reading of the text, before it became a substitute for the Hebrew. Such a *targum* to the Law may well have developed in the synagogues of Alexandria. But it is more likely that the Psalter was translated for use in a temple. Particularly in the Temple of Leontopolis (see ONIAS'S TEMPLE) the need of a version of the Psalter for liturgical purposes would be felt. The translation of the whole Bible was probably completed by the beginning of our era.

Our knowledge of the version is derived from printed editions, extant manuscripts, translations made from it, and quotations in early writers. The *editio princeps* appeared in the Complutensian Polyglot (1514-17), based chiefly upon the manuscripts numbered 68, 108, and 248 in Holmes and Parsons's collection, the Aldine, printed in Venice in 1518, was based on Holmes and Parsons's 20, 68, and 121, the Sixtine edition was published in Rome (1587), and was based on Codex Vaticanus, but supplied and altered by other manuscripts, the Grahian edition, based on Codex Alexandrinus, appeared at Oxford, in 1707-20, the magnificent and indispensable edition of Holmes and Parsons, for which 297 separate codices were more or less carefully collated, among them 20 uncials, was published at Oxford, in 1798-1827. Tischendorf was able to use Codex Sinaiticus for his editions (1850 ff.), and Nestle-Corza's facsimile of Codex Vaticanus for the edition of 1887. Saele's Cambridge edition (1887-94 and 1895-99) was based on the Vatican manuscript, but gave the reading of some of the leading uncials. Of the larger Cambridge edition Brooke and McLean have published vols. i-iii (1906-11) containing the Pentateuch. Its textual apparatus is based on a more accurate collation of the manuscripts and a more extensive material than that of Holmes and Parsons, but it does not attempt to present the readings of all manuscripts, ancient versions and patristic quotations, as did the Oxford edition.

The extant manuscripts are in part uncials or majuscules, and in part cursives or minuscules, some are approximately complete Bibles, others give only portions of the Bible. Among the uncials the most important are Codex Alexandrinus (A), written in the fifth century, probably in Egypt, now in the British Museum, published in autotype facsimile in 1881-83, Codex Vaticanus (B), probably written in Egypt after 367 A.D., published in a facsimile by Corza (1881), and in a more accurate photographic reproduction in 1890, Codex Ephraemi Syri Rescriptus (C), written in Egypt in the fifth century, now in Paris, edited by Tischendorf in 1845, Codex Sinaiticus (S), written probably in the fifth century, now in Leipzig and St. Petersburg, published by the discoverer, Tischendorf, partly in Leipzig, 1846, 1855, and 1857, partly in St. Petersburg, 1892 and 1897, Codex Ambrosianus (F), of the fifth century, now in Milan, published by Ceriani in his *Monumenta sacra et profana III* (1864), Codex Sarravianus (G) of the fifth century, now in

Leiden, Paris, and St. Petersburg, published in 1897, and Codex-Marchalianus (Q), of the sixth century, now in Rome, published in heliotype, 1890, are of particular value because of their Hexaplaric notes and signs. Some recently discovered papyri fragments may date from the third century. Of the numerous cursive manuscripts, none is likely to be older than the ninth century, though some may have been made from uncials older than those in our possession. They manifestly belong to different families, but the classification is as yet imperfect. Of especial interest is Codex Chisianus (88), now in Rome, possibly written in the eleventh century, containing a different translation of Daniel from that of the uncials. Mention should also be made of the Codex Washingtonianus of which Deuteronomy and Joshua have been published by Sanders in *The Old Testament Manuscripts in the Pierer Collection* (1910).

No extant manuscript seems to be older than the three recensions of the text undertaken in the beginning of the fourth century by Lucian in Antioch, Hesychius in Alexandria, and Eusebius and Pamphilus in Caesarea. But some codices unquestionably have preserved independent and earlier textual traditions, while others represent later corrupted forms of these standard texts. Among the daughter versions, the Gothic, Armenian, Georgian, and Slavonic appear to have been made from a text of the Lucianic recension, the Bohemian Egyptian seems to reflect the Hesychian recension, while the Sahidic, in part at least, is earlier in origin, the Ethiopic version has in certain books a marked similarity to Codex Alexandrinus, while elsewhere it apparently was based on Greek manuscripts not known to us, the Arabic version of the Prophets also shows kinship to Codex A, the Old Latin is earlier than Origen, the Syriac version of Paul of Tella was made either from a copy of Origen's Hexapla or from the column edited by Eusebius.

Between 220 and 250 Origen wrote his Hexapla, giving in separate columns the Hebrew, the Hebrew in Greek letters, the officially received Greek text, Aquila, Symmachus, and Theodotion, and in some parts a fifth, sixth, and seventh Greek translation. From the critical editors of Homer he borrowed the signs with which he indicated what was found in the Greek, but not in the Hebrew (obelus), what was found in the Hebrew but not in the Greek, and therefore supplied from some other version (asterisk), and the end of each such passage (metobelus). The original work is lost. Part of a copy made in the tenth century was discovered by Mercati in 1806. As no passage attested by Origen is found in the Old Latin, important changes do not seem to have been made in the version for some time before Origen. All the more startling are some of the variations found in Jewish and Christian writers of the first and second centuries. They apparently point to the existence of another version or text recension already at the end of the first century A.D. On the other hand, there is strong evidence that both Origen's text and that represented by the Old Latin exhibited many peculiarities and numerous additions not found in the original translation. As this translation seems to have been produced by many men, in different places, from the middle of the third century to the beginning of our era, the value of its

different parts is naturally not the same, either from a literary point of view or as a means of discovering the original Hebrew and Aramaic text. With all its natural shortcomings, it is on the whole a close and faithful rendering and constitutes our earliest witness to the original. Recent investigation of the Greek papyri found in Egypt has increased our knowledge of the Hellenistic dialect in which it is written.

As the differences between the Greek version and the current Hebrew text, occasioned largely by expansions in the latter, were observed in an age intent upon textual purity, a desire for a more accurate translation, particularly of some books would naturally arise. Thus 2 Esdras appeared in addition to 1 Esdras, an edition revised by Theodotion beside the Chigi Daniel, the much longer Job known to Theodotion beside the shorter, the longer Jeremiah already familiar to New Testament writers beside the shorter, and possibly a new form of Judges. It is quite probable that new versions of certain books were thus produced not long before Josephus at Antioch or Jerusalem.

(3) In the reign of Hadrian (117-138) Aquila of Sinope, in Pontus, a proselyte to Judaism, made a complete version of the Hebrew Bible, known through ancient writers, fragments of the Hexapla, and a portion found in 1897 by Burkitt among material brought from the Genizah of Cairo to Cambridge. This translation was slavishly literal and removed many inaccuracies of the current version.

(4) Theodotion of Ephesus, another Jewish proselyte, probably in the time of Marcus Aurelius (161-180), executed a less literal, yet faithful translation, preserved in part through ancient writers and fragments of the Hexapla, manifestly on the basis of an earlier text revision.

(5) Symmachus, an Ebionite of Samaritan birth, probably in the reign of Commodus (180-192), produced a more elegant version on the basis of already existing translations.

(6) The most elegant of all versions was Quinta, found by Origen at Nicopolis, near Actium, of uncertain age, possibly a relic of the early Christianity of Ephesus.

(7) Decidedly of Christian origin is Sexta, found at Jericho, c.217.

(8) Of Septima little is known.

(9) The Græcæ Venetæ, found in a Venice manuscript of the fourteenth century, is a version of the Pentateuch, Ruth, Proverbs, Canticles, Lamentations, and Daniel, made by a Jewish translator, possibly Elissæus, c.1360. It attempts to reproduce Attic Greek, but uses the Doric dialect for the Aramaic portions of Daniel.

II *Latin*—(1) There probably existed before Jerome a number of Latin versions. Of these the oldest may date from the end of the second century A.D. As Cyprian is the earliest writer acquainted with it, and as northern Africa was the centre of Latin literature at this time, it has been supposed that the version originated in Carthage. The vulgar dialect in which it is written may, however, have been spoken in other parts of the Empire, and it has been suggested that the relations of the version to a type of Greek text prevailing in Syria points to Antioch as its birthplace. Still others think of northern Italy. It is possible that manuscripts and quotations from early Latin writers represent versions produced independently in different centres of Antiochian and

Italian recensions of an original African text. The Old Latin is the most valuable witness to the Greek text before Origen. P. Sabatier published in 1739-49 from quotations in some of the Fathers and such manuscripts as were then available an edition of the text. Many new manuscripts have been discovered since then. The additional material has been published by Munter, Ranke, Belsheim, Burkitt, and others.

(2) Jerome in 382 was requested to revise this Latin Bible. His first revision was followed after 392 by another, in which he used the obelus and asterisk of Origen. But already, in 390, he had begun his direct translation from the Hebrew, which as a version is a masterpiece, and was destined to become the Bible of the Occident. In this Vulgate version the unrevised books of Ecclesiasticus, Wisdom of Solomon, 1 and 2 Maccabees, and Baruch, as well as the first revision of the Psalter, represent the Old Latin, while Tobit and Judith were translated from Hebrew or Aramaic. Only gradually the new translation won its way. It was exposed to corruption, and in spite of the labours of Cassiodorus, Alcuin, Lanfranc, and others, was found by Roger Bacon to be "horribly corrupted." The Mazarin Bible was printed in 1452, Gutenberg's Psalter, 1457. For the improvement of the Latin text the Hebrew and Greek were used in the Complutensian and the Wittenberg Bibles, by Osander and Pellicanus. Good manuscripts were used by Robert Stephanus for his edition (1528), which became the foundation of the Vulgate, officially recognized as the Bible by the Tridentine Council (1546), and printed with the approval of Sixtus V (1590) and Clement VIII (1593). A thoroughly critical edition does not yet exist.

(3) Among the later Latin translations the following are most noteworthy. The very literal version of Sanctus Pagninus (1528), revised by Servetus (1542), by Stephanus (1557), by Arias Montanus (1572), that of Sebastian Munster (1534-35), the excellent but incomplete work of Leo Jude (1541-42), the elegant version of Sebastian Chateillon (1546-54), the faithful rendering of Immanuel Tremellius and F. du Jon (1571-79), the painstaking version of Johannes Fischer—"Piscator" (1601-07), and those by Cocceus (before 1609), Sebastian Schmidt (1696), Jean le Clerc (1693), Charles François Houbigant (1753) for the first time from a critically restored original, J. A. Dathe (1773-94), and Schott and Winzer (1816).

III *Aramaic*—(1) The Peshita, or Syriac Vulgate, is possibly the earliest of the translations that were made into various Aramaic dialects. It is evidently the work of many men. Concerning the Jewish origin of Proverbs and Chronicles there can be no doubt, and there is no indication of a different origin in the case of the Pentateuch. But in the Psalms and the Prophets the Greek version has clearly been used, either by the original translator or by a later editor, who probably was a Christian. The Hebrew text used shows that no part of the version is likely to be older than the first century A.D., and it may not have been completed until the beginning of the third. It became the Bible of the Edessene church, as the Greek version passed from the synagogue to the Greek churches. The text was printed in the Paris (1645) and London Polyglots (1667), by Lee (1824), at Urmia (1852), by Ceram (Codex Ambrosianus, 1876-83), and at Mosul

(1887) A good discussion of the version may be found in Heller's *Untersuchungen über die Peschita zur gesammten hebraischen Bibel* (1911)

(2) A translation into Syriac from the Greek text of Origen's *Hexapla* was made in Alexandria by Paul of Tella for the Monophysite church in 616, published by Ceriani (1874). It is of great value for the restoration of Origen's text

(3) Numerous fragments have been found of a translation made in Syria, and in vogue among Christians, dating from the fourth century. These have been published by Mrs Lewis in *Palestinian Syriac Lectionary* (1897) and Supplement (1907), and Gwynn, *Remnants of the later Syriac Versions* (1909)

(4) Of the two Targums written in Judean Aramaic, though edited in Babylonia, that are ascribed to Onkelos and Jonathan, the former is probably the older. The translation accompanying the reading of the Law was at first given orally, written renderings to aid the memory may have been gathered in the age of Onkelos (= Aquila), but the final edition cannot have been made before c 400 A.D. The Prophets called for and permitted greater freedom in interpretation, written translations may have begun to appear in the time of Jonathan (Theodotus?), but the final edition is likely to have been made after that of Onkelos. The so-called Jerusalem Targums I, II, and III were not edited before the end of the seventh century, as allusions to the wife and daughter of Mohammed show, while some of the material may be very old, as a reference to John Hyrcanus indicates. The Targums to the Hagiographa belong to the seventh century, to Esther there are two, to Ezra, Nehemiah, and Daniel there is none. The Targums are printed in the Polyglot and Rabbinic Bibles, and by Behmer (Onkelos) and Lagarde (Prophets and Hagiographa). Recently discovered Yemenite manuscripts give a more trustworthy supralinear vocalization.

(5) The Samaritan Targum is based on the Hebrew text adopted by the Shechemite community. It has been published in Paris and London Polyglots and by Petermann-Volters (1872-91). Its age is uncertain. As the "Samaritan" quoted in hexaplaic scholia seems to be a Greek translation of this Targum, it probably existed before Origen's time.

IV *Egyptian*.—(1) The Sahidic version, of which pairs have been published by Ciasca, Erman, Maspero and Lagarde, is probably the oldest of the Egyptian translations, and may go back to the beginning of the third century, as it seems to have been made from a Greek text earlier than that of Origen, at least in the case of Job.

(2) Of the Akhmimic, Fayyumic, and Memphitic recensions of a Middle Egyptian version, somewhat later than the Sahidic, fragments have been published by Zoega, Quatremère, and Maspero.

(3) The Bohairic version, of which Lagarde has published the Pentateuch and Psalter, and Tattam the Prophets, is no doubt the youngest of the Egyptian versions. It may belong to the end of the fourth century.

V *Ethiopic*.—The Ethiopic version was made from the Greek. It is probably the work of different translators from the fifth to the seventh centuries; and it is held by some scholars that our manuscripts represent two different trans-

lations. In some places it seems to have preserved a purer text than that of Origen. In addition to the books of the Greek Bible, it included also such works as Enoch, Jubilees, and Fourth E-dias. The Octateuch was published by Dillmann (1853-71) and by Boyd (1900), Joel, by Dillmann (1879), Jonah, by Wright (1857), Obadiah and Malachi (1892), Lamentations and Isaiah (1893), by Bachmann, the Psalter, by Rodiger (1815), Dillmann published the Apocrypha (1894) and edited texts of Enoch (1851), Jubilees (1859), and Ascensio Isaie (1877), Charles edited Jubilees and Ascensio Isaie (1899), Flemming published a critical text of Enoch (1902), and Charles, an edition of Enoch based on a still larger number of manuscripts (1909).

VI *Gothic*.—A few fragments of Ulfilas's translation of the Old Testament have been found and published by Mai and Castiglione (1817), Gabelentz and Loeb (1843), Massmann, Ulfilas *Die heiligen Schriften des alten und neuen Bundes in gotischer Sprache* (1893-97), and Steinberg, *Die gotische Bibel* (1908-10). The version was made from a Greek text of the Lucianic recension, obtained in Constantinople about the year 350 A.D. Consult Steinberg, *Die griechischen Bestandteile der gotischen Bibel* (1911).

VII *Armenian*.—According to Moses of Choren and Lazar of Phazis, who lived in the fifth century, this version was made between 396 and 430 by Mesrop and Sahak. It was translated in part from a Greek Hexaplaic text, whose obeli and asterisks have survived in some manuscripts, in part from a text of the Lucianic recension. The oldest manuscript at Etchmiadzin is dated 1151. This version was printed in Venice in 1805 and 1890. Its history has been written by Movsesyan (St Petersburg, 1902).

VIII *Georgian*.—Moses of Choren affirms that this version was the work of Mesrop. Whether this is correct or not, it existed in the fifth century and was made from a Greek text. A manuscript Psalter dates from the seventh century, and a manuscript of the Bible at Athens dates from 978. The version has been printed in St Petersburg (1816).

IX *Slavonic*.—The translation of Cyril and Methodius was probably into the Old Slavonic of the Balkan Peninsula, made before they went to Moravia, in the middle of the ninth century. A manuscript Psalter in the glagolitic alphabet belongs to the eleventh century. Esther seems to have been translated from the Hebrew, (Chronicles, Ezra, Nehemiah, Jeremiah 1-xxv, xlii-l), and some of the Apocrypha from the Latin Vulgate, the bulk of the Bible from a Greek text of the Lucianic recension. This Old Slavonic Bible was printed at Ostrog (1581). Some important apocryphal books in the Old Slavonic have been published in recent times. "The Secrets of Enoch" is known only in this version.

X *Arabic*.—(1) There is some evidence that the Law and the Prophets were known through Arabic versions at the end of the seventh and in the eighth century, but nothing has been preserved of them.

(2) The first extant version is that of Saadia ben Joseph al-Fayyumi, who was born in Sura and died 942 A.D. Of this translation, written in Arabic with Hebrew letters, the Pentateuch, Isaiah, and Proverbs have been published by Joseph and Hartwig Derenbourg (1893-96). Frag-

ments of other versions also made by Jews have been found. Important are the translations of Japhet ben Ali, the Karaite, of which the Psalter and Daniel have been published.

(3) Abu Said, a Samaritan, made a translation of the Pentateuch c 1070 A.D.

(4) In many Coptic manuscripts the text is accompanied with an Arabic translation, and other Arabic manuscripts have manifestly been translated from the Coptic.

(5) An Arabic version of the Latin Vulgate appeared in 1671.

(6) The Arabic text in the Paris and London Polyglots is, in certain books, a translation of the Syriac Peshita, made in the thirteenth century. Books translated from the Hexaplar Syriac have been edited by Lagarde and Baudissin.

(7) Certain parts of the Arabic Bible in the Paris and London Polyglots are translated from a Greek text similar to Codex Alexandrinus. For versions of the New Testament in ancient languages, see section *The Text of the New Testament*.

Versions in Modern Languages With the development of the different nationalities and languages of modern Europe, versions of the Bible in the vernacular became a necessity. The history of these different versions in most cases exhibits the same general features. In each country one or two out of a number of independent translations became most commonly used and, either formally or informally, adopted by the national Church. Successive revisions of these national versions have been made necessary by the progressive changes in the vernacular and by the constant improvement in biblical scholarship. Furthermore, in nearly all European languages, independent versions, of various grades of accuracy and popularity, have been frequently published. The following account does not register all the very numerous versions that have been made. It attempts to indicate merely the main points in each national version, with only incidental reference to the most important of the many independent private translations.

English Versions—The translation of the Scriptures into the Anglo-Saxon tongue began as early as the eighth century. Caedmon put parts of the Scripture narrative into verse. Bede (died c 735) translated the Gospel of John. Aldhelm and others made metrical versions of the Psalms. In King Alfred's time other portions, as the Commandments and the Psalter, were translated. Ælfrie (c 1000) translated parts of both Testaments. There was, however, previous to the Norman conquest, no complete and generally used Anglo-Saxon Bible. After the Conquest (1066), under the influence of the Normans, the old Anglo-Saxon became English. During the thirteenth century a revival of religious interest in England led to a number of attempts to translate the Latin Bible into the common tongue. Osm, an Augustinian monk, wrote the Ormulum, a metrical paraphrase of the Gospels and Acts. Others treated Genesis and Exodus in the same way. Lator, by William of Shoreham (c 1320), Richard Rolle, and others, prose versions of the Psalter were made. But these efforts did not produce an English Bible. Down to 1300 only the Psalter had been translated. Twenty-five years later the whole Bible was circulating in a popular English version that common people could easily understand. This great achievement was

mainly due to John Wiclif (died 1384). With his fellow-workers, Nicholas of Hereford and John Purvey, Wiclif completed the entire Bible by 1382. The New Testament part was probably Wiclif's own work. In 1388 the whole was revised by Purvey and made public. The work was, of course, based on the Vulgate. Its avowed purpose was that "pore men" might be able to read the truth. It was welcomed by such, and its effect on the religious life of England was profound. Yet it did not become a national version. Its popularity led to attempts to suppress it, and besides the language was changing so rapidly that many words soon became obsolete. But the seed had been sown, and in due time the Reformation was in progress in England. The adherents of the Reformation keenly felt the need of a translation, especially of the New Testament, in the English of the day. But, though printing was invented in 1450, it was not until 1525 that any part of the English Bible was put into type, and this was done on the Continent. In this respect England was far behind Germany and other countries. The printed English Bible began its history with the New Testament of William Tyndale. His evangelical views compelled him to flee from England to the Continent, and during 1524 and 1525 he was at Wittenberg, Cologne, and Worms. His New Testament was published at Worms, 1525-26, after an unsuccessful attempt to bring it out at Cologne. Copies of the edition at once began to find their way into England. Their sale was prohibited by Parliament. Tyndale published a corrected edition in 1534. Before his death, in 1536, five or more reprints had been issued by Antwerp publishers, some of which were quite inaccurate. This large circulation shows how ineffectual was Parliament's prohibition. In 1530 Tyndale published, probably at Wittenberg, a translation of the Pentateuch. He also translated the historical books from Joshua to 2 Chronicles, but did not live to publish them. His translations were made from the Hebrew and Greek originals. He was very careful in his choice of English words, and the value of his version is mainly due to the fact that its English was the English of the people, not Anglicized Latin. It was also truthful, impartial, and fearless. Because of its intrinsic excellence it became a standard or model text by which all subsequent English versions, as well as the English language, have been most profoundly influenced. This version, especially because of its annotations, was heartily disliked by the King and many of the clergy. But something had to be done to meet the demand for an English Bible. Miles Coverdale (1488-1568), a clergyman of character and ability, at the suggestion of friends in high station, undertook a new translation. He began his task in November, 1534, finished the translation in October, 1535, and in the same year published the first complete English Bible, including the Apocrypha. It was dedicated to Henry VIII. Coverdale evidently borrowed largely from the labors of others. His New Testament was little more than a superficially revised Tyndale. In the Old Testament he depended largely on Tyndale and on Luther's German translation. The work was printed on the Continent, but published in England. Succeeding editions in 1537, 1539, 1550, and 1553 showed much care in revision. In 1539, through the King's indirect permission, the way was opened for the wider

circulation of Coverdale's and other versions, Tyndale's alone being strictly proscribed. In 1537 a large folio Bible, bearing the name of Thomas Matthew as translator, appeared, dedicated to the King. It was, in reality, but a reprint, slightly changed, of Tyndale and Coverdale. In this Bible Tyndale's translation of the Old Testament books from Joshua to 2 Chronicles appeared in print for the first time. The whole was, doubtless, the work of John Rogers, Tyndale's friend and literary executor. The printers, Grafton and Whitechurch, cleverly succeeded in obtaining the royal license, with its exclusive privileges for their publication. "Matthew's" Bible thus became, practically, the first authorized English Bible. In 1539 a revision of this Bible was prepared by Richard Taverner and published, the first complete Bible ever printed in England. Meanwhile Thomas Cromwell was planning the publication of a Bible that might be formally authorized and at the same time acceptable to all the clergy. Coverdale was one of several employed by him to prosecute the work. The sheets were first printed in Paris. These were, however, seized and in part destroyed by the Inquisition. The presses, type, and other material were then removed to England, where the work was published in 1539. Copies of this Bible, which was called the "Great" Bible on account of its size, were ordered to be placed in the parish churches, so that any who desired might read. Until 1568 this Bible held the position of an authorized version. The Scripture passages of the English Prayer Books of 1549-52 were taken from it. Its Psalter is still in use in the English church. During the last seven years of Henry's reign his influence and power were directed against any further efforts to popularize the Bible. With the accession of Edward VI (1547), the proscribed editions began to be reprinted and freely circulated. It is estimated that 75,000 copies of the Scriptures were printed during Edward's reign. Then came the reaction under Mary (1553-58), when the Scriptures were again proscribed and the leaders of the Reformation were persecuted, martyred, or compelled to flee to the Continent. Many of the refugees settled at Geneva, where they published an English New Testament in 1557 and the whole Bible in 1560. These were handy editions, in plain type, with chapters divided into verses and a marginal commentary. This Geneva Bible soon eclipsed all others in popularity. In 1568, under the leadership of Archbishop Parker, the "Bishop's Bible," the joint labor of eight English bishops, was published. Though it thus became the authorized version, it was too expensive to be popular.

The Douai Version.—The strength of the Reformation movement in England drove many English Catholics to France. At Rheims and Douai English colleges were established by these refugees for the purpose of educating young men for the priesthood. In 1582 an English New Testament, with annotations, was published at Rheims by John Fegny. The work was completed by the publication of the Old Testament in 1609 at Douai. The English Bible used by Roman Catholics is thus known as the Douai Bible. It is characteristic of this translation that it was made from the Vulgate and not from the Greek and Hebrew originals. This was because of the decree of the Council of Trent making the Vulgate the standard Bible of the Roman church.

The Rheims Testament of 1582 contains an elaborate preface setting forth the value and proper use of a popular version and defending the accuracy of the following translation. It was a serious, conscientious attempt, hampered, indeed, by a compulsory dependence on the Vulgate, but not altogether blind to the necessity, at times, of falling back on the Greek. Its English is not so idiomatic as that of Tyndale's version. The renderings that have called forth ridicule, such as "the Pasche and the Azymes" (Mark xiv 1), "the justifications of our Lord" (Luke i 6), and the like, are not so numerous as is often implied, nor were they the result of carelessness on the part of the translators. In subsequent editions, such as those of Dr Challoner (London, 1752) and Dr MacMahon (Dublin, 1791) and more modern reprints, these "inkhorn" expressions are rare. In fact, the modern editions of the Douai Bibles show marked improvement over those of 1582 and 1609.

Authorized Version.—At the Hampton Court Conference, 1604, James I was petitioned to give the Geneva Bible preference over the Great and the Bishops' Bible, or else to authorize a new translation of the Scriptures. James was pleased with the latter proposition, and on July 22 directed the Archbishop of Canterbury (Baneriot) to begin the undertaking. The work was done by a commission of 47 members, following directions suggested by the King. In 1611 the translation was completed and published, with a fulsome dedication to the King and a wholesome explanatory and hortatory preface to the reader. According to the preface the translators, by a careful comparison of all preceding versions, sought to make a better one than any of the many good ones then in use. The new Bible was in good demand at once. Five editions were issued in three years. It found, however, a formidable rival in popularity in the Geneva Bible, yet its manifest superiority gave it inside of 50 years the field, and it became the Bible universally used by English-speaking people. Its influence on the English language has been immeasurable.

The Revised Version.—From 1702 to 1870 many schemes for further revision were proposed, and many private translations of the whole or parts of the Bible were published. In 1870 the Convocation of Canterbury entertained a plan for the revision of the Authorized Version of 1611. The work was done by two committees—the one British, the other American—the latter being advisory only. Each committee was divided into an Old Testament and a New Testament company. After long and painstaking labor the Revised New Testament was published in 1881 and the whole Bible in 1885, by the University Presses of Oxford and Cambridge. The sale of the Revised New Testament was at first immense. Many unauthorized reprints appeared in America. It is estimated that in less than one year after issue 3,000,000 copies were sold on both sides of the Atlantic. Though the Revised Bible has been subjected to severe criticism, it has steadily won favor among the more educated circles in preference to the version of 1611. In 1902 this version began to be issued by the British and Foreign Bible Society. This should be the best proof of its general acceptance, as the Society is restricted to the issue of Bibles in current use in English. In 1901 the surviving members of the American

Committee published an *American Revised Version* (New York), embodying the readings they had suggested to the British Committee, and such other improvements as had occurred to them in the interval.

Celtic Versions—In the British Isles there were no Celtic versions before the Reformation. An Irish New Testament was first published in 1595, the Old Testament in 1685. O'Kane's Irish Testament was issued in 1858. In Gaelic a New Testament appeared in 1690, the whole Bible in 1783-1801. It has since been revised in 1826, 1860, and 1880. A Manx version was made in 1770-72. In Cymric a New Testament was printed in 1567, the whole Bible in 1588. A Breton New Testament was published in 1827, another in 1847, the Bible in 1860.

German Versions—The earliest Germanic versions did not include the whole Bible, but generally only the Psalter and the Gospels. The *Monsee Fragments*, of the year 738, rescued from old book covers, belonged to a bilingual copy of the Gospels, Latin on the left, old Bavarian German on the right. The "German Talian" is a harmony of the ninth century in the East Frankish dialect. Such manuscript versions were numerous and continued to be made even after the invention of printing. Of printed German versions before Luther's, a register has been made of 18 editions of the entire Bible, 22 of the Psalter, and 12 of other portions, all between 1466 and 1521. The earliest was the Bible published by Mantel, Strassburg, 1466. Next appeared Eggenstein's, Strassburg, 1470, and Pfanzmann's, Augsburg, 1473. None of these early editions became popular. They were all made from the Vulgate, and by translators who were not masters of the German tongue. It was Luther's translation that made an epoch in the history of both the German Bible and language. Luther began translating as early as 1517, but not until 1521 did he decide to make a new version of the entire Bible. The New Testament was completed during his confinement in the Wartburg (1521-22), and published at Wittenberg by Melchior Lotther, Sept. 21, 1522. A second edition was issued in December of the same year. The Old Testament appeared gradually, the Pentateuch in 1523, other parts later, until in August, 1534, the first complete edition of Luther's Bible was published, probably by Hans Lufft of Wittenberg. The character of this version was such that its author has been called the German translator. It was based on independent study of the original Hebrew and Greek, coupled with marvelous exegetical insight and a remarkable ability to express ideas clearly in strong, pure German. It was so popular that 10 editions of the Bible and 16 of the New Testament were issued in Luther's lifetime, under his supervision, besides over 50 independent and unauthorized reprints. Other German versions made during this period have been almost forgotten, though the excellent translation of the Prophets made by Donck and Hülzer (1527-29), of which 10 editions in quick succession were published, deserves to be mentioned. It appeared before Luther's translation of the Prophets and was made from the Hebrew and Aramaic. From Roman Catholic circles versions were issued in opposition to Luther's, notably Spener's, 1526, Dittenberger's, 1534, and the Cologne Bible of 1630 and 1632, commonly called the "Catholic Bible." Of revisions of Luther's version, the "Dutch-

ge-eheue Bibel," and an official revision of 1892 ff., called the "Probeibel," are the most recent and important. Of the many independent German versions since Luther the most important are Piscator's, 1602, De Wette and Augustin's, 1809-69, E. Reuss's, 1892-94, E. Kautsch's (Old Testament), 1890-94 (2d ed., 1896, 3d ed., 1913), C. Weissbach's (New Testament), 7th ed., 1894, and J. Weiss (2d ed., 1907).

In Switzerland Luther's version became known at once. The delay in the publication of the fourth and fifth parts of the Old Testament led to an independent translation of these portions at Zurich in 1520. The Zurich Bible, issued in 1530, was largely identical with Luther's. This has been revised from time to time, most recently in 1895 (New Testament and Psalms only).

Dutch Versions—During the fourteenth and fifteenth centuries a Dutch version, made perhaps as early as 1300, was represented in many manuscripts, none containing the whole Bible. On the basis of this version a portion of the Bible was printed at Delft in 1477. In 1478 the "Cologne Bible," the first complete Bible in Low German, was published. In 1522 a Dutch revision of Luther's New Testament was printed at Basel and Amsterdam. In 1524 an independent Dutch translation of Erasmus' Greek New Testament, "in goede platte Duytsche," appeared at Delft. This was followed in 1526 at Antwerp by a Bible of the Reformation period. On the Roman Catholic side a New Testament was printed in 1527, the whole Bible in 1548. In Protestant Holland many Bibles were issued by the various branches of the Reformed Church. In 1632 the Dutch Bible was officially revised by order of the States-general and the Synod of Dort. This was published in 1636, and became known as the "Staaten Bibel." Of modern editions, the most noteworthy is the revision undertaken at the request of the synod by Kuenen and his disciples, known in Holland as the "Synod Bibel" (New Testament, 1866, Old Testament, 1897-1902).

Scandinavian Versions—Parts of the Bible existed in Old Norwegian and Old Swedish as early as the twelfth and thirteenth centuries, somewhat later in Old Danish. Under the auspices of Christian II a New Testament was issued in Danish in 1524, but it was not well received. In 1529 a Danish New Testament and Psalms by Christen Pedersen (1480-1554) was published at Antwerp, in 1531 a new and improved edition, and in the same year a Danish translation of the Psalms. But it was not till 1550 that the whole Bible was printed in Danish, the version being based on Luther's German. A revision of this in 1605-07 was not popular. After the separation of Norway (in 1814) a revision for Denmark alone was made in 1819. In 1872 a second revision was published. In Norway revisions were published in 1830, 1857-60, and 1890, and of the New Testament in 1904, as well as a new version in the "landsmaal" of the New Testament in 1889, new ed. in 1899. In Icelandic a New Testament was issued in 1540, the whole Bible in 1584. This was revised in 1644, and a number of times after. In Sweden a translation of the New Testament, made by Laurentius Andree and Olaus Petri on the basis of Luther's version, was printed in Stockholm in 1526. Parts of the Old Testament appeared in 1536, and in 1540-41 the entire Bible, translated by Laurentius Petri, Lauren-

tus Andree, and Olaus Petri, was published in Stockholm. The most important revisions have been those by Johan Gezelius, father and son (1674-1724), Odman and Tingstadius (1774-93), and Toien, Lindgren, and Melin (1853-79). The new version of the New Testament, which since 1883 is officially recognized by the Lutheran church, is the work of Sundberg, Toien, and Johanson. Of independent translations, those by Thomander and Waldenström of the New Testament, and by Fjallsted and Melin of the whole Bible, have enjoyed the greatest popularity. Perhaps the most elegant and scholarly versions of biblical books are those by F. O. Myrberg.

French—The earliest versions on French soil were in the Teutonic dialects. Not until the twelfth century was any part of the Bible translated into French. The first printed French Testament appeared in 1477 at Lyons. In 1487 a large edition of the Bible was issued, dedicated to Charles VIII. This was followed by other sumptuous expensive editions. Of a more popular character were the translations by J. Lefebvre d'Étaples (New Testament 1523, Old Testament, 1528, lacking the Psalter, Bible, 1530), all based on the Vulgate. In 1540 this Bible was placed on the Index. The Louvain Bible of 1550, though only a slightly altered Lefebvre d'Étaples, became the generally used Roman Catholic Bible of France. It was revised in 1608, 1621, and 1647. More modern versions, to keep pace with the development of the French language, have appeared from time to time, such as the New Testament of Richard Simon, 1702, and the Port Royal Bible of 1667-87. Of modern Roman Catholic versions, Lasserre's *Gospels*, 1887, is excellent, though not approved by the Church authorities. On the Protestant side Olvetan (Peter Robert), Calvin's cousin, made a translation which was issued at 1535 at Serrières at the expense of the Waldenses. In subsequent editions this version was greatly improved. It was revised in 1588 by the Geneva pastors. In 1721 and 1744 J. F. Ostervald made a more modern version, which succeeded Olvetan's as the Bible of French Protestantism. Ostervald's version was revised, not very successfully, in 1805 (Old Testament) and 1835 (New Testament). Better modern revisions of the same are those of Ségond, 1874 and 1880, and the New Testament of Ollivarez, 1872, and that of the French Bible Society, 1891. Other good modern translations are those of Perier-Gentil, Neuchâtel, 1817 ff. (Old Testament), Eug. Annand, 1858 (New Testament), A. Rilliet, Geneva, 1859 (New Testament), E. Stapfer, Paris, 1889 (New Testament), E. Reuss, Paris, 1874 ff., Ledram, 1886-96, Zadoc Kahn, 1901 ff., and Ciampun, revised by the Jesuits, 1907.

Italian—The first Italian version was made probably by Waldensian missionaries, in north Italy in the thirteenth century. The first printed Italian Bible was that of Nicola de Malherbia, Venice, 1471. The better translation of Ant. Brucellini, Venice, 1530-32, based on the Hebrew and Greek, was prohibited. Other early versions were those of Zaccaria, 1532, and Giglio, 1551, both of Venice. From Protestant circles an Italian New Testament was issued at Lyons in 1551, and a Bible at Geneva in 1562. In 1607 Giovanni Diodati, of Lucerne, issued a Bible at Geneva. In 1776 the Archbishop of Florence, Ant. Martini, published a Bible at

Turin, which, being favored by the Church, was the version adopted by the British and Foreign Bible Society in their Italian editions of the Sacred Scriptures. A Roman Catholic revision of the Martini Bible was issued in 1880.

Spanish—In Catalonia a version of the New Testament was made as early as the fourteenth century. A Bible was printed in Valencia in 1478. In Castile, on account of the large number of Jews, Spanish versions of the Old Testament were not uncommon in the fourteenth and fifteenth centuries. The first printed Spanish New Testament was issued at Antwerp, 1543, the second at Geneva, 1546. In 1553 an Old Testament was printed at Ferrara, a double edition, the joint work of Jews and Christians. The first Spanish Bible, translated by Cassiodoro Reyna, was published at Basel, 1560, revised at Amsterdam in 1602. These books circulated in the Netherlands and Italy, but were prohibited in Spain. In 1790 the Roman Catholic Miguel published a Bible at Valencia which became commonly used, and was reprinted in 1828 by the British and Foreign Bible Society for distribution in Spain.

In *Portuguese* a new Testament was printed in 1691 at Amsterdam. In 1712-19 the same translator, J. F. d'Almeida, published the Pentateuch and Historical Books. In 1778 a Bible, the first printed in Portugal, was published at Lisbon, the work of A. P. Figueiredo. This version has been reprinted by the British and Foreign Bible Society.

Slavic Versions—The beginnings of the Slavic versions go back to the efforts of Cyril and Methodius in the ninth century. The first version for general use among the Slavs of Russia was made in the fifteenth century. In 1581, under the auspices of Prince Constantine, a Bible was published at Ostrog. A revision of this was published in 1663 at Moscow. In 1753 a more thorough revision was made under the auspices of the Empress Elizabeth. In the early part of the nineteenth century, for linguistic reasons, the Holy Synod authorized another revision. This was partially published, 1818-25, by the Russian Bible Society, but opposition to the society prevented further progress until after the accession of Alexander II. In 1876 the revision was completed and published. The dates of the first versions in the other Slavic languages are as follows: Greek (Bohemian), fourteenth century (first printed edition, 1488), Bulgarian, 1828, Croatian, 1495, Polish, thirteenth century (first printed in the fifteenth century), Serbian, 1817, Sloven, 1555, Wend, 1547.

Modern Greek—A modern Greek version of parts of the Old Testament was made by the Jews in 1547. In 1638 certain Dutch Protestants had a modern Greek Testament published at Geneva. Another one was issued in England in 1703. These were forbidden by the authorities of the Greek church. In 1830 the British and Foreign Bible Society republished and circulated this translation. In 1833-38 a new and better version of the New Testament was published, and the Old Testament was also gradually rendered into modern Greek. Later editions appeared in 1861 and 1872. The attempt to circulate a new revision in 1901, in the army, led to student riots in Athens, because it was supposed to emanate from Russia and to be the entering wedge for such a version into the Church.

In *Magyar* or *Hungarian* a New Testament was first printed in 1541. The whole Bible was published in 1590. A modern revision is partially completed. The *Lithuanian* and *Lettish* version began with the New Testament and Psalms in 1662. A *Finnish* New Testament was published in 1548, the Bible in 1642. A new translation was made in 1859. The *Lapps* received the Bible in their own tongue in 1838-40.

Of modern missionary versions, only brief mention can be made. The whole or parts of the Bible have been translated into about 400 languages, many of these, of course, being dialects of one main stock. As to particulars, it may be specified that the entire Bible has been rendered into upward of 40 Indian dialects of the Western Hemisphere, into 60 dialects and languages of Africa, into many of the tongues of the Pacific Isles, into Japanese, Chinese, the various dialects of India, into Arabic, Persian, Turkish, modern Armenian, Kurdish, Georgian, and modern Syriac. The uplifting and civilizing influence of such translations is beyond all estimation.

V THE TEXTUAL CRITICISM OF THE BIBLE

Text of the Old Testament. Our knowledge of the Masoretic text is derived from the printed editions and the extant manuscripts. The Psalter was printed in 1477, probably at Bologna, the Pentateuch in 1482, at Bologna, the Five Megilloth, possibly also in 1482, at Bologna, the Prophets in 1486, at Soncino, the *Itaglographia* in 1486-87, at Naples. Of the whole Bible, the *editio princeps* appeared at Soncino in 1488. A second edition was probably printed at Naples, 1491-93. The third edition, used by Luther, appeared at Brescia in 1493, and a fourth at Pesaro in 1511-17. For the Complutensian Polyglot, printed at Alcalá, 1514-17, Cardinal Ximenes employed Alfonso de Zamora, who had at his disposal seven valuable manuscripts. The first Rabbinic Bible was edited by the Christian Jew, Felix of Plato, and published by Daniel Bomberg at Venice, in 1516-17. Of this, quarto editions appeared in 1518, 1521, and 1525-28. The *editio princeps* of Jacob ben Chayim's Rabbinic Bible, with the Masora, was published by Bomberg at Venice in 1524-25. Of all the earlier editions, this is the most accurate. These editions were, in part, based on manuscripts not known at the present time. A mixture of the Complutensian and the Bomberg texts is found in the Antwerp (1569-72), Paris (1629-45), and London (1654-57) Polyglots, and in Hutter's edition (1587). More critical value, because of the collation of new manuscripts, must be accorded to the editions of Joseph Athias (1661 and 1687), Jablonski (1699), Van der Hooght (1705), Optiz (1709), and J. I. Michahis (1720). But particularly valuable is the edition of Raphael Chayim Italia, printed at Mantua in 1742-44, because of the subjoined commentary of Jedidja Salomo Norzi (written 1626). Kennicott's Bible (1776-80) was the result of a collation of over 600 manuscripts. An indispensable supplement to this work was published by De Rossi (1781, 1788, 1798). Together Kennicott and De Rossi possessed some knowledge of 1346 manuscripts and over 300 editions. The books have been carefully edited by Baer and Delitzsch (1869-95, 14 parts, including all except Exodus, Leviticus, Numbers, and Deuteronomy). A Masoretic, critical edition,

based on Jacob ben Chayim's text, was published in 1804 by Ginsburg, with a valuable apparatus, and a more recent critical edition is that by Kittel and a company of scholars assisting him (Leipzig, 1906-08, 2d ed., 1909), also provided with an apparatus.

The manuscripts are either unpunctuated parchments or leather rolls of the Pentateuch and the Megilloth for public use, or pointed codices in book form of parchment or paper for private use. By direct statement or by handwriting, they are shown to have been made in Spain, Italy, Germany, France, Egypt, Arabia, or Syria. The oldest dated manuscript is the St. Petersburg Codex of the Latter Prophets, written in 1228 of the Seleucid Era, or 916 A.D. It is possible that a manuscript of the Law in the British Museum (Or 4445) belongs to the ninth century. But it is difficult to determine the age of a Hebrew manuscript on paleographical grounds, and the dates given are not always reliable. The work of classifying these manuscripts into families, according to age and country, and of comparing their minute differences, has been retarded by the discovery that they all represent substantially the same recension of the text. This fact has been explained by many scholars as due to the adoption of one model codex and the destruction or retirement of its rivals. It is more likely, however, that the uniformity results from the labors of scribes and Masorites. Among the Masoretic marginal annotations there are frequent references to standard codices, now lost, such as Codices Mugal, Hillel, Zambuki, Jericho, Sinai, Machzor rabba, Ezra, and Babil. Of these, the oldest seems to date from c. 600. There is no reason to suppose that any of them differed essentially from those now known, though they may have contained many minor differences, not wholly without importance. For the Masorites, who from the sixth to the eleventh century supplied the text with annotations, vowel points, and accents, were, as the name implies (Masora, 'tradition'), chiefly recorders of a tradition that had already taken form. It was above all to preserve the traditional reading of the Scriptures that they entered their marginal notes on textual peculiarities, introduced their systems of vowel notation, and indicated the accents as aids in cantillation. The latest of these activities was the accentuation. Possibly as early as 700 A.D. the punctuation marks and *neumes* used in Greek lectionaries and psalters began to be adopted as an assistance to the eye in the musical declamation of certain books. This chanting itself had grown out of a particularly solemn reading. The written signs probably took the place of manual signs without changing the customary intonation. While the same system was applied to all books in Babylonia, a special system was developed in Palestine for Psalms, Proverbs, and Job. Many differences still existed in the eleventh century between the Babylonian school of Jacob ben Naphtali and the Palestinian school of Aaron ben Asher. During the seventh century the vowel signs seem to have been introduced. The infra-linear system, derived from the Nestorians, is likely to have been earlier than the supra-linear system exhibited, e.g., by the St. Petersburg Codex of 916 A.D., wrongly supposed to have been Babylonian. That the vowel points are not earlier than 500 A.D. is evident from the Talmud, which does not know any such signs. In regard to the vocalization, minor differences

have been recorded between the Babylonian schools at Nehardea, Sura, and Pumbedita and between these and the Palestinian school of Tiberias. It was probably during the sixth century that the Masora, in its narrower sense, was inserted by the side of the text (*Masora parva*), or at the bottom and the top of the page (*Masora magna*), or at the end and beginning of the book (*Masora finalis*). This is a body of annotations, partly indicating how in doubtful cases the text should be read (qere' = 'it is read,' sebir = 'it is thought'), partly giving summaries, concordantal matter, and the like. This material was gathered during the Talmudic period (c 180-500 A.D.).

Quotations in the Mishna, the Palestinian Talmud, the Midrashim, and the Babylonian Talmud, the Aramaic Targums, and Jerome, and less directly the later Greek versions, reveal the consonantal text that enjoyed canonical authority from the second to the sixth century. It is probable that a standard text was gradually obtained, and that divergent types were naturally eliminated as a result of the critical process by which the canon was established, and of the demand that holy scriptures should be written exclusively in the Syrian ("Assyrian") characters to facilitate correct reading and to distinguish approved codices. Certain differences between the earliest Greek version and the Masoretic text suggest that, in the case of some of the Prophets and the Hagiographa, the codices used by the Alexandrian translators were written in the Egypto-Aramaic alphabet, possibly already in the middle of the second century B.C. As the Book of Esther (last third of the second century B.C.) still associates the Hebrew language and its peculiar script (viii 9), the change probably began somewhat later in Palestine. The lingering preference for the older letters yielded only to the practical considerations of the scribes in the course of the first century A.D. All rolls were not transcribed from the old Semitic alphabet at the same time, but as new copies were made, the request to write them in the characters then in vogue in Syria (resembling the Palmyrene and the Nabataean) was more and more followed. While many copyists' errors undoubtedly were committed, the text is not likely to have suffered very greatly in this process of transcription. For the motive of the change was a deeper reverence for the text that was deemed canonical and a desire for greater accuracy. This regard for the codices copied and the traditional reading is evidenced by the curious arrest of the tendency to indicate by vowel letters the pronunciation, and by the introduction of spaces between words. Since, in the Talmudic period, only copies written in the later Syrian characters would be used as models, the disappearance of older manuscripts is naturally accounted for.

Concerning the state of the text from the third century B.C. to the second century A.D. we possess a certain amount of knowledge through the Samaritan Pentateuch and its Targum, the earliest Greek version, and the translations made from it, the Book of Jubilees, the earliest Syriac version, and some writers of the period. For the Pentateuch, the testimony is most direct, as the Samaritan copy is written in Hebrew and in the old characters, slightly modified. Our earliest manuscript, however, is of the thirteenth century, and the age of this recension is very uncertain. There is no evidence that the

present text is identical with the one recognized by the Samaritan community at the time when the temple on Gerizim was built. But the fact that many of its 6000 deviations from the Masoretic text agree with the Greek version suggests that it gained a definite form at an earlier date than the Judean law. It is printed in the Paris and London Polyglots. The difference between the Masoretic text and that from which the oldest Greek version was made is very great. The latter manifestly had no division of words, used vowel letters very sparingly, was in some passages longer, and in many more instances shorter, than the Masoretic text, and frequently presented different consonants. It is evident, from the Book of Jubilees, that the text had not yet assumed its present form in Palestine at the beginning of our era. Whether the codices that were first rendered into Syriac presented a type akin to those used by the Alexandrian translators, or corrections were made after the second century A.D. to bring the Syriac version into harmony with the Greek, cannot easily be determined.

The earliest condition of the Hebrew text can only be surmised, and the original itself approximately restored, by a critical sifting of all this comparatively late material, by observation of parallelism, metre, and logical connection, and by scientific conjecture. In the attempt to reconstruct the earliest form of the text, literary and historical criticism must come to the aid of the investigator, removing later glosses, interpolations, annotations, editorial remarks, and mistaken ascriptions, and thus revealing the growth and composition of the biblical books. Houbigant first undertook to publish a translation based upon a critically restored text (1753). Since then the necessity of such work has been in increasing measure felt by scholars. The greatest enterprise in this direction has been the publication of the Polyglotte Bible under the editorship of Paul Haupt, of which 18 out of 20 parts have appeared (New York, 1898 et seq.).

The earliest division of the several books was occasioned by the practice of reading certain sections of the Law and the Prophets on the Sabbath. In Palestine the Law was read in about three years, in Babylonia in one year. Hence the 154 Palestinian *sedarim* of the Law and the corresponding *haphthoroth* of the Prophets and the 54 Babylonian *perashoth*. There were also 379 shorter paragraphs called "closed," because the next section began on the same line, and 200 "open" paragraphs. These Jewish sections were frequently arranged with a view to the effect of the opening and closing sentences rather than to the logical connection, and are not superior to the Christian chapters, imperfect as they are, that Stephen Langthorn introduced in 1270.

Text of the New Testament (1) *The History of the New Testament Text. The Autographs and First Copies*.—In all probability the New Testament autographs were written on the perishable papyrus paper. They circulated at first separately and independently of each other. Copies began to be made at once. With the first of such copies the history of the New Testament text began. Early Christianity was free, informal, and not distinguished for literary culture. Therefore the first copies of the New Testament books were not always carefully executed, especially if made for private use only.

Yet such copies must have been used as exemplars from which other copies were made.

The External Form—This was, except in the case of the smaller epistles, that of the roll. After a time it was customary to write several books on one large roll. The roll form was, however, inconvenient. Probably the whole New Testament was never written on one large roll. It is evident that the text of a manuscript or roll comprising several books would depend for its accuracy on the quality of the text of each of the separate copies used as exemplars rather than on the skill of the scribe who executed it.

The Origin of Variant Readings and Various Types of Text—It was during the first two centuries that the most of the more important errors, or variant readings, crept into the New Testament text. Then the churches were most independent of each other; intercourse between leaders of Christian thought in different parts of the world was more rare and scholarship less accurate than was the case later. The absence of a standard text and the lack of competent supervision made the production of errors almost inevitable. The same conditions permitted the use of several distinct types of text. In any given locality—Rome, for example—the Christian teachers would seek to establish a uniform text. They would try to eliminate the differences between their copies of the New Testament books. Thus there came into being and common use a Roman type of text. Such measures could not, of course, produce absolute uniformity even in Rome. Essentially the same process went on in other centres of Christian influence—as, for example, Alexandria.

Improvement in the Third and Fourth Centuries—During the third century the Church improved its scholarship. Parchment was being used in preference to papyrus. The roll form was giving way to the codex. The older copies of the New Testament writings were being used as standards of comparison. The scholars of Rome, Alexandria, Carthage, Antioch, and other centres of Christian learning were coming to know each other's work. Comparison of texts was possible. Such conditions brought about a more conservative spirit. Scholars sought to correct, eliminate, or prevent errors in manuscripts. The result was, on the whole, beneficial. The labors of Origen (c 185–254 A.D.), Pamphilus (died 309), Eusebius (date uncertain), Lucian of Antioch (250–315 A.D.), and Jerome (c 340–420 A.D.), were all inspired by the desire to ascertain and preserve the true text. These efforts did not produce a uniform text, but they tended to check the production and propagation of errors. By the end of the fourth century several main types of text were dominant. One of these was the so-called Western text, represented in the writings of Irenaeus, in the early Latin fathers, Tertullian and Cyprian of Carthage, in the Old Latin Version, in the earliest forms of the Syriac Version, and, in part, in the Egyptian Version. Another type of text is found in the writings of the Alexandrian Fathers. In the East—in Antioch, and afterward Constantinople—a third type, sometimes called the Syriac, made its appearance. The Syriac text is a later and less original type than the Western, or Alexandrian. There were, of course, many manuscripts whose text was so confused as not to be representative of any particular type.

From about 450 A.D. the history of the Greek

text (or manuscripts) contains nothing needing special mention.

The Printed Greek Text—The first printed Greek Testaments were those of Erasmus, published at Basel, by Froben, in 1516–35, five editions in all, and that included in the Complutensian Polyglot, printed 1514–17 but not published until 1521, at Alcalá, Spain. These were followed by the beautiful Regius editions of Robert Stephens (Etienne), of Paris (1546–51, four editions), of which the third, that of 1550, is the most famous, and of Theodore Beza, of Geneva (1565–1611, 10 editions). The text of all these earliest editions was practically the same, not based on early or good manuscripts, or constructed on true critical principles. In 1624 a Greek Testament was issued from the Elsevir Press, of Leyden, based on the editions just mentioned, which informed the reader that he had therein the "textum nunc ob omnibus receptum." This edition gained great currency, and its "textus receptus" became commonly used throughout Protestant circles.

The continuous discovery of Greek manuscripts and the more careful study of the versions and fathers, showed only too plainly that the received text was far from identical with that of the more ancient witnesses. It now became the task of scholarship to seek to ascertain, if possible, the correct text. Soon the so-called critical editions began to make their appearance. The first great work of this kind was the New Testament of John Mill (Oxford, 1707), a large folio volume with prolegomena containing a mine of information. This was followed by the editions of J. A. Bengel (Tübingen, 1734), of J. J. Wettstein (Amsterdam, 1751–52), and of C. F. Matthaei (1782–88), and others of less importance. The next step in advance was taken by J. J. Griesbach, in his two-volume edition of 1786 and 1806, and his *Symbolae Criticae* (1785 and 1793). In his printed text the readings of the received text were often supplanted by those which seemed more strongly supported. Griesbach, like Bengel, followed clearly defined critical principles. In 1840–50 the philologist, Carl Lachman, published a New Testament in which the received text was altogether discarded. In its place was a text constructed by the critic on the basis of evidence. This method has been followed in all subsequent critical editions.

The work of all these men was used and more than supplemented by the gigantic labors of Tischendorf in his great eighth edition, published in 1865–72, containing a critical text and an apparatus exhibiting all the more important variants then known. Similar in character, and also the monument of the labor of a lifetime, was the Greek Testament of S. P. Tregelles, which appeared in 1857–72. In 1881, after 25 years' joint study, the edition of Westcott and Hort was published at Cambridge and London—the text in one volume, an introduction and appendix in another, written by Dr. Hort. The veteran German exegete, Bernhard Weiss, has also crowned his lifelong study of the New Testament by an edition of its text (1900). A valuable recent edition, with a very ample textual apparatus, has been published by Von Soden (1902–07), and Gregory has devoted years of careful study to the perfection of Tischendorf's text, consult his *Prolegomena* (1908), and also Nestle's excellent *Einführung in das Neue Testament* (1900).

(2) *The Textual Criticism of the New Testament*—Since the autographs of the New Testament have long since perished, the existing witnesses to the text must be carefully studied, their variations noted, and a decision reached, if possible, as to which variants are to be preferred as more nearly representing the readings of the autograph. This is textual criticism.

(a) *The witnesses to the text of the New Testament* are (1) Greek manuscripts, (2) ancient versions, (3) New Testament citations found in the writings of ecclesiastical writers, especially of the first five centuries. (1) Greek manuscripts are of two kinds, *uncial* and *cursive*. The uncials are those written in capitals or semi-capitals, the letters being unconnected with each other. Some of the uncial manuscripts contain the whole or large portions of the New Testament, while others are only fragments, stray leaves of lost codices. They are all earlier than the tenth century. In the ninth century the cursive or running style of handwriting came into use. Manuscripts written in this are called cursives. No cursives are earlier than the ninth century, but many of them preserve ancient and valuable texts. While there are less than a hundred uncials, the known cursives number over 1400 for the Gospels alone. Among all these manuscripts five uncials deserve special mention. (1) The *Codex Sinaiticus*, now in St Petersburg, containing the whole New Testament, with the Epistle of Barnabas and a part of Ilermas, was discovered by Tischendorf in the Monastery of St Catharine at Mount Sinai, in February, 1859. It was probably written in the fifth century. Its leaves are of fine parchment, or vellum, 13½ inches wide by 14½ inches high. The text is in four columns of 48 lines each. The codex once contained the whole Bible. (2) The *Codex Alexandinus*, one of the treasures of the British Museum, was written in the fifth century. It is also a manuscript of the entire Bible. To the New Testament were added 1 and 2 Clement. The whole manuscript contains 773 leaves, of which 639 belong to the Old Testament. The pages measure 10½ by 12½ inches, with two columns on each. The text is divided into sections, or paragraphs, instead of being without a break (except at the end of a book), as in the Sinaiticus and Vaticanus. (3) The *Codex Vaticanus*, in the Vatican Library at Rome, is probably the best New Testament manuscript in existence. It was probably written at the end of the fourth century, after 367 A.D. Like the Sinaiticus, it is a manuscript of the whole Bible, though some parts are lacking. Its pages measure 10 by 10½ inches. Its vellum is of the finest quality, 142 of its 750 leaves belong to the New Testament. The last part of the volume is missing. The New Testament text is written in three columns on a page. (4) The *Codex Ephraemi Rescriptus*. This is a palimpsest, i.e., a manuscript whose original writing has been erased in order that the parchment might be used for another work. In this case a part of a Greek Bible was used on which to write some of the works of the Syrian father Ephraem. By means of chemicals, the original writing has been partially restored. The manuscript has but one broad column on a page. It was written in the fifth century. At present it contains only about two-thirds of the New Testament, many parts having been lost. The Codex is in the National Library in Paris. (5) The

Codex Bezae is a manuscript of the Gospels and Acts, written in the sixth century. It is a bilingual codex, the Greek text being on the left, the Latin on the right, page of the open book. There is but one column on a page. This manuscript was presented to the University of Cambridge, by Theodore Beza, in 1581.

For convenience of reference manuscripts are designated by symbols, either letters of an alphabet or numbers. Thus, the five uncials just described are designated by the letters α (or S), A, B, C, D, respectively.

In addition to New Testament manuscripts, the service books of the Greek church, containing lessons for daily reading, are useful witnesses to the New Testament text. Over 1000 such books, ranging in date from the fourth to the fourteenth century, are known.

(2) *The Versions*—For textual criticism, the three most important versions are the Syriac, the Latin, and the Egyptian.

The origin of the *Syriac Version* is hidden in obscurity. It is altogether likely, judging from the parallel history of the Latin Version, that the first translations were of a private character, the work of different Christian teachers in the early days of Syrian Christianity. Tatian (about 150–175 A.D.), a companion of Justin Martyr after his quarrel with the Roman church, returned to his native Syria, and there published his *Diatessaron*, a compilation of the four canonical Gospels into a continuous narrative. Some have thought that this was the beginning of the Syriac New Testament. However that may be, it is a remarkable fact that the earliest forms of the Syriac Version were made from a Greek text similar to that prevalent in Rome in the latter half of the second century. Such, in general, is the text found in the fragments discovered by William Cureton in 1842 (published in 1858), and in the Syriac palimpsest discovered in 1892 at Mount Sinai by Mrs. Lewis and her sister, Mrs. Gibson. The great importance of the Sinaitic Syriac is generally recognized. While, in the judgment of many scholars, it has been somewhat overemphasized by Merx, this eminent Orientalist has furnished an exceedingly learned and suggestive commentary on this version (1897–1905). After a while these earlier forms of text became more conformed to the type of Greek text prevalent in the East. This text is represented in the Peshita, or common Syriac Version, which was current as early as the fourth century. The Philoxenian, or Harkleian, Version, a slavishly literal translation, begun in 508 A.D., was revised and completed in 616 A.D. It was published by White (1778–1803) and its text of Acts was discussed by Pott (1908). The Jerusalem, or Palestinian, Version was made about the same time, for the use of the Syrian churches of Palestine. It has been published by Buzzo, Lagarde, and Mrs. Gibson.

The Latin Version—Not until about the end of the second century did the need arise for a Latin New Testament. The early Roman Christians used Greek. It was in country districts, probably, especially in northwest Africa, that the first Latin translations were made. These were private translations for local use. The text was of the Western type, current in Rome and northern Africa. A little later the same thing took place in Italy. The effect of so many independent versions was that in the time of Augustine (354–430) and Jerome (c.340–420)

the Latin text was greatly confused. At the solicitation of Damasus, Bishop of Rome, Jerome undertook to revise it. Though he used the best Greek manuscripts at his disposal, yet his work was but a revision, not a new translation. It was published about 384 A.D. It slowly but steadily won its way to supremacy, and so became known as the *Vulgata*, or commonly used version. Through careless copying and mixture with older types of text the *Vulgata* became corrupted. It was revised by Alcuin in 801, by Lanfranc in 1069-89, and by others in succeeding centuries. In obedience to a decree of the Council of Trent (1546), a revised *Vulgata* was published in 1589-90 with the sanction of Pope Sixtus V. (the *Sistine Vulgate*). This was found so faulty that in 1592, under the auspices of Pope Clement VIII., the *Clementine Vulgate*, the standard Bible of the Roman Catholic church, was issued. A critical revision of the *Vulgata* has been made in England (Wordsworth and White's *Novum Testamentum Latine*). The *Codex Amiatinus*, the most important manuscript of the *Vulgata*, is one of the most magnificent books in the world.

The Egyptian or Coptic Versions.—The early history of these versions is exceedingly obscure. Several dialects were spoken by the native Egyptian during the early Christian centuries, such as the Sahidic, in Upper Egypt, the Akkimmic, Fayyumic, and Memphitic, in middle Egypt, and the Bohairic in the Delta. In each of these there seems to have been a version. The earliest of them was the Sahidic. The beginnings of this version may go back to c. 200 A.D. It was designed in the first place to meet the needs of the uncultivated populations of the rural districts. For some unknown reason the text of these versions, represented in our New Testament manuscripts, is more Western than Alexandrian.

The other ancient versions are of minor importance. The *Armenian* seems to have been made in the fifth century, the *Georgian* a little later. The *Gothic*, the work of Ulfilas, second bishop of the Goths in Mesia, dates from the latter half of the fourth century. The *Ethiopic*, used in the churches of Abyssinia, was made between the fifth and seventh centuries. The *Persian* and the *Arabic* are later. The earliest *Slavonic* version dates from the ninth century. The *Frankish* of the ninth and the *Anglo-Saxon* of the tenth century were made from the Latin.

(3) A third class of witnesses to the text of the New Testament consists of the patristic citations. Among the Fathers, Irenaeus, Tertullian, and Cyprian are the main representatives of the Western text, Clement of Alexandria, and Origen of the Alexandrian, while the post-Nicene fathers, especially of the East, generally represent the Syrian text.

(b) *The Principles of Textual Criticism*.—The first printed Greek Testaments were uncritical and based on few and late manuscripts. With the appearance of Mill's New Testament in 1707 A.D. it was seen that the number of witnesses to be consulted was very large, and that the variant readings were to be counted by the thousands. The first attempts to decide between readings were based, naturally, either on mere individual preference or on the comparative number and age of the opposing authorities. It was soon found, however, that such simple rules were not sufficient. For very often the reading that commends itself on grounds of in-

trinsic worth and probability is absent from the majority of manuscripts, including some of the oldest. It is well known that difficult readings in an autograph are quite likely to be changed in the course of transcription to easier or smoother ones. The reverse is not the case. Hence we have the celebrated canon of Bengel, "*proclivae scripturae praestat aetna*," i.e., the more difficult reading is to be preferred to the easier. Other principles or canons are, "that reading is to be preferred which seems to have been likely to have been the source of the others," and, "the shorter reading is to be preferred." Such canons are the result of close observation and are necessary to prevent the too free use of mere conjecture. But a textual critic deals not merely with readings alone. Readings are contained in documents, and the quality and inter-relationship of the documents must be considered. If 9 out of 10 manuscripts are all copies of one and the same manuscript, their united testimony amounts only to the testimony of the one manuscript from which they are derived. If that one was a poor manuscript, the text of the nine copies can be no better. Therefore the testimony of one manuscript may be of more weight than that of a number of opponents. That a majority of witnesses favor a reading is not a necessary indication of its correctness. The witness of a manuscript which is carefully executed or seems to have been exceptionally fortunate in its ancestry should be allowed great weight. The general value of a manuscript is ascertained by a careful examination of each of its various readings. Hence the canon adopted by Westcott and Hort, "knowledge of documents should precede judgment on readings." Another canon, formulated by the same critics, is drawn from the fact that the relation between the different manuscripts of a work is like that of the several branches of a genealogical tree. With any new copy or set of copies serious changes may be introduced. Such copies may become, in their turn, parents of large numbers of others, all of which will exhibit the same characteristic changes. These readings will be absent from manuscripts belonging to another line of descent. So we have the canon, "all trustworthy restoration of corrupted texts is founded upon a study of their history—that is, of the relations of descent or affinity which connect the several documents." The value of these principles is now universally recognized.

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BIBLE, CURIOUS EDITIONS OF. Besides those issues of the book which have historical importance are those notable for curious errors or for incidents of publication. The following is a list of the more familiar of these, with their peculiar designations.

THE GUTENBERG BIBLE. The earliest book known printed from movable metal types is the Latin Bible issued by Gutenberg at Mainz, 1452–56 A.D., also known as the Mainz Bible, because the copy which first attracted the notice of bibliographers was discovered by Debus in 1760 among the books of Cardinal Mainz (d. 1661).

THE BIBLE OF THIRTY SIX LINES. A folio edition of the Biblia Latina, of the time of Gutenberg, the pages of which contain two columns of 36 lines.

THE BUG BIBLE. So called from its rendering of Ps. xcii. 5 "Afraid of bugs by night." Our present version reads "Terror by night." 1551 A.D.

THE BRECHES BIBLE. The Geneva version is sometimes called the Breches Bible, from its rendering of Gen. iii. 7 "Making themselves breeches out of fig-leaves." This translation of the Scriptures—the result of the labors of the English exiles at Geneva—was the English Family Bible during the reign of Queen Elizabeth, and till supplanted by the present authorized version of King James I. This Bible appeared in 1580.

THE PLACE MAKERS' BIBLE. From a remarkable typographical error which occurs in Matt. v. 9 "Blessed are the place-makers," instead of peace makers. 1562.

THE TRIFACLE BIBLE From its rendering of Jer viii 22 "Is there no treacle [instead of balm] in Gilead?" 1568

THE ROSIN BIBLE From the same text, but translated 'rosin' in the Douai Version 1609

THE HE AND SHE BIBLES From the respective renderings of Ruth iii 15—one reading 'She went into the city' the other, 'He went' 1611

THE WICKED BIBLE From the fact that the negative has been left out of the Seventh Commandment (Ex xx 14), for which the printer was fined £300 1631

THE THUMB BIBLE One inch square and half an inch thick, published at Aberdeen in 1670

THE VINEGAR BIBLE So named from the headline of the twentieth chapter of Luke, which reads "The parable of the vinegar," instead of the 'vineyard' 1717

THE PRINTERS' BIBLE We are told by Cotton Mather that in a Bible printed prior to 1702 a blundering typographer made King David exclaim 'Printers [instead of "Princes"] have persecuted me without a cause' See Ps cxix 161

THE MURDERERS' BIBLE So called from an error in the sixteenth verse of the Epistle of Jude, the word "murderers" being used instead of "murmurers" 1801.

THE STANDING FISHES BIBLE "And it shall come to pass that the fishes will stand upon it," etc Ezek xlviii 10 Printed in 1806

THE DISCHARGE BIBLE "I discharge thee before God" 1 Tim v 21 Printed in 1806

THE WIFE-HATER BIBLE "If any man come to me, and hate not his father . . . yea, and his own wife also," etc Luke xiv 26 Printed in 1810

THE EARS TO EAR BIBLE "Who hath ears to ear, let him hear" Matt xiii 43 Printed in 1810

REBEKAH'S CAMELS BIBLE "And Rebekah arose, and her camels" Gen xxiv 61 Printed in 1823

TO REMAIN BIBLE "Persecuted him that was born after the spirit to remain, even so it is now" Gal iv 20 This typographical error, which was perpetuated in the first 8vo Bible printed for the Bible Society, takes its chief importance from the curious circumstances under which it arose. A 12mo Bible was being printed at Cambridge in 1805, and the proof reader, being in doubt as to whether or not he should remove a comma, applied to his superior, and the reply, penciled on the margin, "to remain," was transferred to the body of the text and repeated in the Bible Society's 8vo edition of 1805-06, and also in another 12mo edition of 1819

THE CANTON MEMORIAL BIBLE Wholly printed and bound in 12 hours, but only 100 copies struck off 1877 See also DEVIL'S BIBLE

BIBLE, ILLUSTRATIONS OF As soon as the earliest *symbolic* stage of Christian art had passed, which is represented by the Catacombs (q.v.), and their frescoes of the second, third, and early fourth centuries, the *historical* stage began, when the emblems, allegories, and symbols, such as vine, anchor, dove, fish, good shepherd, are replaced by scenes from the Old and New Testaments. These scenes were at first used in more than their purely historical sense. In the same way as in contemporary writings, many scenes of the Old Testament were used as symbols of events in the new dispensation, thus,

Noah in the ark, the sacrifice of Abraham, Elijah caught up to heaven, Jonah cast up by the whale, Moses striking the rock, are all used, not only as prefigurations of Christ, but also as images of the salvation of the elect. The three children in the fiery furnace, and refusing to adore the statue of Nebuchadnezzar, as well as Daniel in the lion's den, are symbols of Christian martyrdom. These and many other subjects always had, for the Christian masses, even in the fourth and fifth centuries, a meaning far transcending the historic (See SYMBOLISM). But before 400 A.D. the construction of a number of great churches (see BASILICA) had put before the artists an immense expanse of wall to be covered with Christian subjects, and at the same time the freedom to teach Christian doctrine had made it possible to multiply manuscripts of the Bible and to illustrate them artistically, in order by images to bring the truth home to the masses that could not read. The authorities of the Church seized at as a means of propagating and strengthening the faith.

Bible history was the principal form of this teaching in monumental forms on church walls, in miniature form on the pages of Bible manuscripts. We cannot say which served as a model to the other, for both sprang up simultaneously. The Rossano Gospels, the Vienna and the London Genesis, the original of the roll of Joshua (see ILLUMINATED MANUSCRIPTS), all of the fifth century, are as early as the mosaic pictures of Santa Maria Maggiore at Rome (see MOSAICS) and Sant' Apollinare Nuovo at Ravenna. In these works we see Bible history without symbolic intention for the first time. In place of a few subjects, selected for their suggestiveness from Bible pages, every event that forms a picturable episode is treated by the artist. It became the custom to give up the whole of one side of the nave walls to the Old Testament, the opposite side to the New Testament, and then to represent on the triumphal arch and apse the more spiritual subjects of Christ Triumphant and the Heavenly Jerusalem. Very soon it was found necessary to systematize the new exuberance, to exercise a process of selection, to reduce the number of subjects, so that everything essential from Genesis to Revelations could be crowded into one church or one manuscript. It became the rôle of the foremost erudite churchmen to select the subjects for the artists. About 400 A.D. Prudentius (q.v.) made a selection of 40 subjects, 24 each from the Old and New Testaments, the 49th being for the apse and representing the Heavenly Jerusalem, each with a descriptive inscription in verse. Often these subjects were selected so as to form parallel related series, in which each subject of the Old Testament bore a remarkable similarity to one opposite it from the New Testament.

Meanwhile the illumination of Bible codices in the same fashion was steadily progressing, and having begun in the East, with Greek manuscripts, passed to the West, where the work was carried forward by the Benedictine monks. The church frescoes and mosaics were mainly for the teaching of the masses, but these codex illustrations were intended for the instruction of the teachers themselves. Certainly series like the mosaic pictures from the Old Testament in the nave of Santa Maria Maggiore seem copies from some illustrated Bible rather than creations of the mosaicists. The letters of Paulinus of Nola (c.400) show how he would sug-

gest themes to his friends who were building and decorating churches. With the constant spread of Christianity and the rapid building of churches, the mass of the clergy, unfamiliar with the detailed system of Christian art, were glad to use for their guidance these illustrated texts executed at a few artistic centres under the instructions of the foremost thinkers. Hence the uniformity of treatment, hence the formation of a tradition, for these miniatures gave not only subject, but treatment, composition, colors, attitudes. There are even manuscripts where the places in the church that certain subjects should occupy are noted. Where symbolism descended to the colors of garments, to the emblems held, to the form of the nimbus, no detail could be neglected. So it came to be that the painter was merely the hand, and the churchman the brain behind it. After a while these traditions, it is true, became the property of the painters themselves, so that they required no prompting. The period of lay artists was followed by that of monastic artists (seventh to eleventh century), when the thought and the hand were one. Then such works as the Byzantine *Guide to Painting* came into existence, which became the painter's *vade mecum*, where every subject of Christian art was minutely described as it should be painted. And the form of this guide, even now in use among Greek painters of Mount Athos and Thessaly, goes back as far as the eleventh century.

Bible illustrations, besides continuously instructing the people already converted, were used as instruments in missionary work. In order to convert the Anglo Saxons, for instance, Benedict Biscop, who built the two greatest early monasteries in England, brought from Rome a series of small pictures illustrating the Old and New Testaments and had them reproduced on the church walls. For the conversion of the Saxons, Charlemagne's *Capitulares* insist, no new church was complete until it had its tale of instructive pictures. In the conversion of the Bulgarians, Methodius, the Apostle to the Slavs, is said to have brought about the change of heart of the King and his people mainly through the effect of a painting of the Last Judgment. This period—roughly, the Carolingian era—was one of great activity in Bible illustrations, both in codices and in church walls. The element of fear began to be more emphasized than that of love and peace. The torments of hell were soon to replace the visions of the Heavenly Jerusalem, in the same way as in the fifth century the Heavenly Jerusalem had replaced the Garden of Paradise of the Catacombs, but this transformation progressed slowly, between the eighth and thirteenth centuries, culminating in the Torcello mosaics and in poetry in Dante's *Inferno*.

Hitherto no distinction has been drawn between the Bible illustrations in the East and those in the West, because in this part of Christian art there was less chance for divergences than in other branches, still, even here, Eastern art showed far more poetry and imagination. The age of the iconoclasts there was a crucial epoch in Eastern Bible illustration and in many ways revived antique traditions, which were kept much fresher in the East. The dull level of mediocrity which then ruled the West was not really broken until the approach of the Gothic age in the twelfth century. Then scholasticism came to the rescue of art. The encyclopedic passion was vivified by religious fervor,

the mysticism of a St Bernard, a St Victor, and a St Bonaventura gave to the pictorial image of the world's essence and history which was then attempted a value far transcending the historic Bible illustration, as pure history, was still faithfully carried on, but it no longer occupied the old-time prominent place. There was a return to symbolism, but on a far higher, more imaginative, as well as more intellectual plane than that of the early Christian period. The "Wise and Foolish Virgins," the "Tree of Jesse," were Bible illustrations, but not in the historic sense. There was a new life in the teaching of religion. But, while the purely historic series no longer were so prominent on church walls, the work of Bible illustration continued in codices unabated. In fact, there were—perhaps there had been before—series of such illustrations bound together with descriptive inscriptions and text, but without the Bible texts themselves. Such manuals continued in use until very late. When printing and block engraving were invented in the fifteenth century, they could be multiplied in cheap form and circulated among the people. (See *BIBLIA PAUPERUM*.) From these sprang the really artistic series of prints by such artists as Albrecht Dürer, from whom our more modern Bible illustrators descend. But after the masses learned to read and write, and after the text of the Bible itself became accessible to the majority, such illustrations no longer played the really important rôle in the development of Christianity which they had held for over 1200 years.

BIBLE, RESTRICTIONS UPON THE READING OF, BY THE LAITY. The Roman Catholic and Protestant churches differ on this point, in that the former punts authorized translations and requests the faithful to restrict their reading to them, and makes the vernacular translations from the Latin Vulgate text, whereas the latter as such authorize no version, adopts no standard text, but encourages every one to read translations which are made directly from the Hebrew and Greek originals. In the earliest times we find no evidence of any prohibition of Bible reading by the laity. On the contrary, as the foundation on which the Church was built, and the sole source of religious knowledge, the reading of the Bible formed an essential part of the instruction communicated by pastors to their congregations, and the greatest orators of the Church—especially Chrysostom and Augustine—continually reminded their hearers that private reading and study of the Scriptures should follow attendance on public services. Warnings are found here and there in the Fathers against the abuse or mistake of the meaning of Scripture, these warnings imply that Scripture reading was common among the laity. In 1080 Gregory VII declared that Latin should be the universal language of Catholic worship, and consequently excluded all vernacular readings of Scripture in church services. Again, with regard to the Waldenses, Innocent III, in 1190, prohibited the private possession and reading of Scripture (excepting the portions contained in the Breviary and the Psalter) without priestly permission and supervision. Similar prohibitions were repeated at the Synod of Toulouse (1229), in its fourteenth canon, and with regard to Welf, at the Synod of Oxford (1382). Ultimately the recognized Latin Version, or Vulgate, was more and more decidedly made the sole authorized Church Version. In-

deed, as early as 1233, the Synod of Tarragona in its second canon ordered that no one, either priest or layman, should retain in his possession a copy of the Romanic translation of the Bible. As, however, it soon appeared that little could be effected by such prohibitions, milder measures were employed. The Council of Trent (1545-63) at its fourth session (April 8, 1546) passed a decree concerning the canonical Scriptures, which gave a list of the books which were received, made the Vulgate Latin Version the sole authoritative source of quotation, and threatened with punishment those who presumed to interpret the Scriptures contrary to the sense given them by the Fathers. But nothing was determined with regard to Bible reading among the laity. This was first done in the publication of the first *Index Librorum Prohibitorum* (Rome, 1564), which enjoined the necessity of obtaining written permission of the bishop before a lay person could read the Bible in the vernacular. Afterward the rules of the Church, placing the use of the Scriptures under the supervision of the bishops, were more and more strictly defined. The publication of the New Testament with practical annotations by Paschasius Quesnel (1687) gave occasion to the Roman Catholic church to speak more definitely on the reading of the Bible by the laity in the bull *Unigenitus Dei Filii* (1713). New ordinances were issued by Pope Pius VII in his brief to the archbishops of Gnesen and Mohilev (1816) against translations formerly authorized, again, by Leo XII, in his condemnation of Bible societies (1824), by Pius VIII (1820), Gregory XVI (1844), and by Pius IX, who, in his famous *Syllabus of Errors* (1864, sec. iv), condemns Bible societies, because they "publish the Bible 'without note and comment,' and so encourage erroneous private interpretations." Leo XIII advocated the reading of the Scriptures in his Encyclical of Nov. 18, 1893, upon "The Study of the Bible."

The position of the Greek church is somewhat different. It has passed no plain prohibition of Bible translations to the laity, without church guidance, as the Latin church has. But in three of the questions appended to the *Eighteen Decrees of the Synod of Jerusalem*, otherwise called *The Confession of Dositheus* (1672), which relate to the Scriptures, it answers in the negative the question whether it is permitted to all Christians to read the Bible. It then goes on to explain that only those who had given it special study were able rightly to interpret it. Agreeably to the spirit of this prohibition, Czar Nicholas I in 1826 suppressed the society for the circulation of the Russian vernacular translation of the Bible, allowed by Czar Alexander I in 1813.

BIBLE ARCHÆOLOGY. The name that is sometimes given to a branch of study whose object is to elucidate the Jewish and Christian Scriptures by means of the archaeological remains of ancient Israel and Judah and of other peoples mentioned in the Bible. In the strictest sense archaeology deals only with such remains as material objects, and not with the epigraphical material, which belongs to the domain of philology and history. But as the inscribed monuments have, as a rule, been brought to light through archaeological research, and the meaning of the texts has often been first discussed by archaeologists, the distinction has not always been closely drawn, and archaeology is popularly

understood as having to do with the inscriptions as well as with the character of the monuments. It was once customary to include in biblical archaeology a great variety of subjects, such as the religious, social, and political conditions, the arts and sciences, manners and customs, geography and topography, flora and fauna of Palestine in early days and of other lands and nations referred to in the biblical books.

In recent times, however, many of these fields have been cultivated separately and have not been regarded as belonging to the proper sphere of archaeology. Thus the geography of Palestine has been treated by itself, with more or less attention to the geology, flora, and fauna, as well as to the more important results of exploration and excavation, as in the works of Robinson, Guérin, Conder, Buhl, and George Adam Smith. Like all historiography, that of Israel and Judah and of the Jewish people in the Roman period has had a tendency to include not only the political but the entire social development in its various aspects. Such historians of ancient Israel as Ewald, Renan, Gratz, Stade, Wellhausen, Winckler, and Kittel have not limited themselves to the political relations, but taken cognizance of the social conditions, and especially the religious ideas and practices, and the same applies to Hausath, Holtzmann, and Schurei, who have dealt with the Roman period. The development of what has been called biblical theology has given us a number of separate text books, setting forth historically and yet in systematic form the expressions, in ideas, customs, and institutions, of the religious life of ancient Israel and the early Christian church. This has limited the field which it has been regarded as proper to treat under the title of archaeology. But many excellent works on Hebrew archaeology have been published, notably those by De Wette, Nowack, and Benzinger, in which the archaeological remains as well as the literary sources have been used for a systematic representation of the social life of Israel in its different aspects. They have generally divided the material into secular and sacred institutions, and proved very helpful because of the convenient grouping of this material and the increasingly adequate and accurate illustrations.

While it cannot be maintained that a complete and scientifically satisfactory survey has yet been made of the whole of Palestine, the labors of Conder, Clermont Ganneau, Kitchener, Schumacher, Musil, and many other explorers have furnished a fairly reliable working basis. The excavations carried on by the Palestine Exploration Fund, especially at Lachish, Gezer, and Jerusalem, by the Austrians at Megiddo and Taanakh, by the Deutsche Orient Gesellschaft at Jericho and Capernaum, and by the Americans (Harvard University) at Samaria, have been of epoch-making significance for the early history of Palestine and have furnished an abundance of important archaeological material. Of very great value has been the establishment of schools in Palestine devoted to archaeological research, such as the French School of the Dominicans, the German School, and the American School for Oriental Study and Research, all in Jerusalem. The results of their investigations have been published chiefly in the *Revue Biblique Internationale*, the *Zeitschrift* and the *Mitteilungen des deutschen Palästina Vereins*, the *Journal of Biblical Literature*, and the *Jour-*

nal of the American Institute of Archaeology, but also in many other periodicals and books. Valuable reports and discussions also appear in the *Proceedings of the Society of Biblical Archaeology* and the publications of the Palestine Exploration Fund.

On the other hand, our knowledge of the nations with which Israel and Judah and the first generations of Christians came into contact has increased to such an extent that their antiquities are naturally treated in connection with their history, and it no longer seems expedient to deal extensively with them in discussions that have primarily to do with biblical lore. At the same time the discoveries made have been so great and startling that very naturally a keen interest has been aroused as to their possible bearing on the biblical accounts. The comparative study has not always been marked by sufficient historic objectivity. As most of the inscriptions are original autographs, their statements have often been accepted without criticism as of more authority than those found in records of which we possess only late copies, when a more searching examination has revealed their untrustworthiness or improbability. Conclusions have been drawn, from one side or another, which have subsequently been seen to be without validity or in need of modification. Sometimes the evidence has tended to strengthen the positions which critics have been led to assume, sometimes it has been more favorable to the traditional views, not seldom it has only offered new problems for which new solutions must be found. As the paramount importance of such external, contemporaneous, and indirect testimony is readily appreciated, there has often been a tendency to exaggerate the conflict between the supposedly assured results of archaeology in this sense and the traditional views or the opinions of critical students, with an unfortunate lack of due discrimination in either case.

Thus the similarity between the Sumerian and Akkadian legends concerning chaos, creation, paradise, and deluge and the stories in Genesis, seemed at first to indicate a direct borrowing and a very late date when Israel and Judah had been invaded by Assyrian armies, or exiles lived in Babylonia. When it was found, however, that such narratives had already spread from Babylonia to Egypt and probably also to Syria in the Tell el Amarna period (fourteenth century B.C.), the arguments for a late date and a direct derivation were considerably weakened, yet cannot be said to have been conclusively disposed of. Similarly the analogy between the code of Hammurapi (2184-2081 B.C.) and some of the Pentateuchal codes is scarcely of a nature to suggest direct dependence, but raises a question both as to the age of the latter and as to their possible derivation, at least in part, from the common law of Canaan, to some extent influenced by the principles of jurisprudence established during the occupation of the land by an Amorite dynasty reigning in Babylon. The inconclusiveness of the evidence is well illustrated in the case of Genesis xiv. That Amraphel is Hammurapi is extremely probable (see AMIRAPHEL, HAMMURAPI), that Arioch may be Rim Sin is not impossible, since Aku seems to be the Elamite equivalent of Sin, yet it cannot be strictly proved (see ARIOCH); that Chedorlaomer represents a genuine Elamite name Kudur Lagamar (servant of the goddess

Lagamar) has long been recognized, but this name has not yet been found in any inscription (see CHEDORLAOMER), that Tidal may be Tudhul is clear, and Goyim, peoples, may be a textual error for Gutim, but the Tudhul mentioned in a tablet from the Persian period is not said to be a Gutian king, that the tablet referring to Eri-ekna and Tudhul is late does not show that they are unhistorical, and while there is nothing improbable in an expedition to Palestine by an Elamite king, Kudur Lagamar, accompanied by Hammurapi, still subject to Elam, Rim Sin, and Tudhul, the source whence the account came to the author of Genesis xiv is still unknown, and there is nothing to indicate whether Abram, the Hebrew, and Melchizedek were mentioned in this source. What is now known concerning the Amorites (qv) through the Boghaz Keui tablets and Babylonian inscriptions places in a new light the accounts of Og of Bashan and Sihon of Heshbon and increases their probability, but these kings are not mentioned in any inscriptions. The fact that some system of writing was in vogue in Palestine and neighboring countries at the time of the Hebrew invasion has at times unduly affected the judgment as to the unity and Mosaic authorship of the Pentateuch, to the neglect of the internal evidence furnished by the work itself. Archaeological research in Egypt has hitherto failed to produce any evidence of the sojourn of Israel in that country, while the reference, in the Meremphth stele, to Israel as manifestly settled in Palestine at the time of that King has upset the generally held theory as to the oppression and exodus in the days of Rameses II and his son. But this solitary allusion to "Israel" in Egyptian literature furnishes a fresh problem, and the silence of the monuments cannot be adduced as a sufficient evidence against the historicity of Israel's sojourn in Egypt. The Tell el Amarna tablets seem to refer to the Hebrews (Habiru), but what ethnic elements were included under that term cannot be determined. If the Elephantine papyri (qv) appear to have fortified the position of those who believe in a late date for Deuteronomy and some other parts of the Pentateuch, they have also tended to strengthen the traditional view of Nehemiah's date and increased the probability of a Jewish dispersion in Egypt at the time of Jeremiah (qv). From the inscriptions of the Chaldean kings, the Marduk priests, and Cyrus, the legendary character of the stories in Daniel is manifest, but the actual position of Belshazzar (qv), whose existence was doubted, renders the origin of the dramatic story in Daniel v more intelligible. Certain discrepancies between the Assyrian inscriptions and the accounts in the Book of Kings have occasionally led to an undue disparagement of the latter. For several centuries the Assyrian chronology is the most reliable we possess, and it has been of great value both in confirming and in correcting the biblical chronology. The references to kings of Israel like Omri, Ahab, Pekah, Pekahiah, and Hoshea, and kings of Judah like Ahaz, Hezekiah, and Manasse agree well with the biblical narrations. But the statements of Assyrian kings in display inscriptions are not always to be taken at their face value. Thus Sargon's claim to have conquered Samaria, which has generally been accepted in spite of the conflicting statement in the Bible, is rendered very doubtful by the reference to the con-

quest of Samaria (Samarina) by Shalmaneser V in the Babylonian Chronicle and the consideration that it was a matter of no importance either to Babylonians or Israelites who the conqueror was, while Sargon not infrequently makes similar claims that have proved to be without foundation. Mention should also be made of the inscription of Meshu, King of Moab, and of Zakir, King of Hamath.

The archaeological material available for elucidation of the New Testament is not so rich. But in this field also recent research has brought to light important documents and remains. The Hymn to Augustus, the Egyptian census, the Gallic decree, the results of exploration and excavation in Asia Minor, the papyri of the Græco-Roman period, and the study of the mystery cults may be specially mentioned as having shed light on many questions and led to their discussion from new points of view.

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BIBLE CHRISTIANS See METHODISM
BIBLE OF THE POOR See BIBLIA PAUPERUM

BIBLE SOCIETY A religious society, having exclusively for its object the translation and diffusion of the Sacred Scriptures. Such associations must be regarded as a natural form of expression of Christian benevolence, acting according to the principles of Protestantism, and seeking to take advantage of the facilities afforded by the art of printing, but a long period elapsed after the Reformation before a Bible society was formed—during which, how-

ever, an extensive diffusion of the Scriptures took place, and partly by the agency of associations which included it among other means for the advancement of Christianity. It necessarily became, along with the translation of the Scriptures, one of the objects to which missionary societies directed their energy. But perhaps the first association ever formed for the sole and specific purpose of providing copies of the Scriptures for those who were destitute of them was that founded by Baron Hildebrand von Canstein, an intimate friend of Spener, in conjunction with Francke at Halle, which, down to 1834, when other Bible societies were beginning to make their appearance in Germany, had distributed 2,754,350 copies of the Bible and about 2,000,000 copies of the New Testament. The impulse, however, to the formation of the Bible societies now existing in all parts of Protestant Christendom proceeded from England, where in 1780 an association was formed for the distribution of Bibles among soldiers and sailors. It was at first simply called "The Bible Society", it exists at the present day, and is known as the Naval and Military Bible Society, and, confining itself to its original specific object, has accomplished much good. It is not an uninteresting circumstance that the first ship in which Bibles were distributed by this society was the ill-fated *Royal George*. Early in 1792 a similar association was formed in London, under the name of the French Bible Society, with a similar limited and specified object of distributing Bibles in the French tongue. It was probably the attitude assumed by infidelity in France which occasioned the formation of this society, but the greater part of its funds, having been remitted to Paris for the printing of the Bible there, was lost, and everything belonging to the society destroyed during the Revolution. In 1802 the first steps were taken towards the formation of the BRITISH AND FOREIGN BIBLE SOCIETY, the parent of a multitude of similar institutions, and the establishment of which must be regarded as a great epoch in the history of this branch of Christian beneficence, nor was the society fully organized and established till March 7, 1804. Its formation resulted from the deep impression made upon the mind of the Rev. Thomas Charles, of Bala, in Wales, by the great lack of Bibles which he found to exist in the sphere of his labors, and particularly by a circumstance strikingly illustrative of that destitution. The facts as to this are variously related, but one form of the story is as follows. Meeting a little girl, Mary Jones—a name had in loving remembrance by the friends of Bible societies—he inquired if she could repeat the text from which he had preached on the preceding Sunday. Instead of giving a prompt reply, she remained silent, and then, weeping, told him that the weather had been so bad she could not get to read the Bible. She had been accustomed to travel every week seven miles over the hills to a place where she could obtain access to the Welsh Bible. Mr. Charles, on his next visit to London, brought the subject of the want of Bibles in Wales to the notice of the committee of the Religious Tract Society (q.v.), when it was suggested by Mr. Hughes, a member of the committee, that a society might be formed for the purpose of supplying Bibles, not only in Wales but wherever they were lacking throughout the world. The society was constituted on the

widest possible basis, Churchmen and Dissenters being alike included in it, and soon attained a greatness corresponding with that of the other two religious societies, the London Missionary Society (see MISSIONS), and the Religious Tract Society, which had been formed on similar principles a few years before. It was indeed able to expend only about £619 in the first year of its existence, but its annual income gradually increased to an average of £70,000, and in 1875-76 it amounted to £116,802, derived from the donations, legacies, collections, etc., and applicable to the general purposes of the society, besides £108 for a special object (the "Roxburghe fund"), and £105,410 derived from sales of Bibles and Testaments, abstracts, monthly reports, etc., showing the net receipts for the year to be £222,320. In 1912-13 the expenditures of the society amounted to £269,311. Auxiliary and branch societies and dependent associations rapidly sprang up in all parts of Great Britain and in the colonies the number of which at present amounts to between 5000 and 6000. Large sums have, of course, been spent by the British and Foreign Bible Society for the diffusion of the Authorized English Version of the Bible. The fundamental law of the society had for a long time restricted it to the publication of this version only in English, but a change in its constitution has been made, by which the Revised Version can be published. It has also spent large sums in printing and circulating the Scriptures in the different Celtic languages spoken in Great Britain and Ireland. It has developed an effective system of agencies for thoroughly meeting the needs of Great Britain. The foreign department of this work has gradually become, with the progress of modern missions, one of its chief functions. It stands ready to print the translations of the Bible prepared by missionaries and offered for publication, and in many cases has been prominent in initiating the undertaking of such translations. The translation, printing, or distribution of the whole or part of the Bible has been promoted by the society in 450 languages or dialects. The foreign field employed over 1200 colporteurs in 1912-13 to distribute the Scriptures. Its list now contains the Bible in 111 languages, complete New Testaments in 108 more, and some portion of the Scriptures in more than 231 others. To print these, over 50 different styles of characters are required. The payments made by the society for the services of translators, revisers, and proof readers amounted in this last fiscal year to about £4000. The extent of its operations can be measured in some degree by its issues. These, during the last two years, were

1912-1913 COMPARED WITH 1911-1912

Bibles	936,346	Bibles	908,377
Testaments	1,266,919	Testaments	1,584,202
Portions	5,090,297	Portions	4,841,884
Total	7,899,562	Total	7,894,523

The total issues for the society for the 109 years since its foundation in 1804 amount to nearly 244,444,855 copies. These stupendous figures become still more impressive by a closer survey of its work in various foreign-mission fields of the world, where the society maintains agents to direct its operations. These operations are now conducted on a scale practically coextensive with the advancing tide of modern missionary conquest, so that wherever the

missionary goes, and sometimes before he goes, the colporteur is found at his task of Scripture distribution.

In the principal countries of Europe, including Russia, where it has generally the cordial support of the Russian church, in Central Asia, Siberia, Persia, Turkey, Greece, Egypt, Algeria, Morocco, South Africa, Madagascar, the Indian Empire, China, Japan, Australia, South and Central America, British North America—in fine, throughout the whole world its labors are abundant and successful.

A controversy concerning the circulation of the books of the Apocrypha along with the canonical Scriptures by the British and Foreign Bible Society (see APOCRYPHA) led to a resolution in 1826 that its funds should be devoted, according to its original design, to the diffusion of the canonical books alone. The Edinburgh Bible Society existed from that time forward as an entirely separate society till 1861, when all the Scottish societies amalgamated to form the NATIONAL BIBLE SOCIETY OF SCOTLAND.

Of the numerous Bible societies of Germany, the most important and extensively ramified is the Prussian Central Bible Society (*Hauptbibelgesellschaft*) in Berlin. It was founded in 1814, has branches in all parts of the Prussian dominions, and distributes annually about 116,000 Bibles and 60,000 New Testaments. There are besides numerous independent Bible societies in other parts of the German Empire, as in Wurttemberg, Saxony, Bavaria, and Mecklenburg, but they are of less importance. All these societies unite in supplying the German army with Bibles and Testaments. They also now circulate the revised Lutheran version. A large number of Bibles are still, however, annually supplied to the people of Germany by the agents of the British and Foreign Bible Society. Bible societies were prohibited by the Austrian government in 1817, and some which had already been established in Hungary were dissolved. The RUSSIAN BIBLE SOCIETY, founded at St Petersburg in 1813, through the exertions of Dr Paterson, and under the patronage of the Emperor Alexander I, entered upon a career of great activity and usefulness, cooperating with the British and Foreign Bible Society for the printing of the Scriptures in the numerous languages spoken within the Russian dominions, but its operations were suspended in 1826 on the accession of the Emperor Nicholas, its stock of Bibles, and the whole concern, being transferred to the Holy Synod, under the claim that the sacred work of supplying the people with the Holy Scriptures belonged to the Church and not to a secular society. The Bibles and Testaments in stock were indeed sold, and very large editions were thus disposed of, but the activity of a society which had no equal in continental Europe was at an end. A Protestant Bible society was then formed for the purpose of providing editions of the Scriptures, and circulating them among the Protestants of all parts of the Empire, which now reckons about 300 auxiliary societies. But the action of this society "does not touch the members of the Greek church, or, if at all, only slightly and incidentally, and it makes no provision of the Scriptures in the language spoken by the great mass of the people. It is merely designed to meet the wants of colonists and others, who do not use the Russian language." Of the translations of the Scriptures published by the origi-

nal Russian Bible Society, the greater number have never been repented since its suppression.

The principal Bible Society in the United States is the American Bible Society.

The organization of the AMERICAN BIBLE SOCIETY was preceded by a period of awakening interest in the translation and circulation of the Scriptures. This showed itself in a variety of ways. The first portion of Scripture printed in America was the New Testament, translated into the Indian language by John Eliot, and printed at Cambridge, Mass., in 1661, a translation of the whole Bible followed in 1663. A German Bible was printed at Germantown, Pa., in 1743. In 1777 the English New Testament, and in 1782 the entire Bible, was printed at Philadelphia. This was the first English Bible with an American imprint, and it was recommended by Congress, after an examination by the chaplains. A petition had been presented to the National Congress during the Revolutionary War asking that an appropriation of public funds be made for the printing of Bibles, and in response thereto Congress directed that 20,000 copies be imported at the public expense. The first Bible Society in the United States was instituted at Philadelphia in 1808, the second, at Hartford, the third, at Boston, the fourth, at New York, the fifth, at Princeton, N. J.—all in 1809. In a few years there were about 60. Delegates from 35 of these societies met in New York, May, 1816, and organized the American Bible Society, to which the local organizations generally became auxiliary. The number of auxiliaries increased rapidly, and in 1905 amounted to about 700—a number, however, considerably less than the total of a few years ago. In 1841 an act of incorporation for the American Bible Society was obtained with privileges which have since been enlarged. The first place of business was a room 7 feet by 9, the next was 20 feet square, the third was in a building erected in Nassau Street on a lot 50 feet by 100 and afterward enlarged. In 1852 the Bible House was built, occupying the whole of the ground bounded by Third and Fourth avenues, Astor Place, and Ninth Street, a brick building having an open square in the centre and six stories in height. It is one of the oldest office buildings in New York City, and at the time of its erection was considered an imposing structure. The working force consists of the executive and manufacturing departments, the former containing the corresponding secretaries and treasurer, the latter including printing, electrotyping, proof reading, etc. The printing is done on modern presses. In the bindery, also, modern improvements have been introduced. The society owns 120 sets of electrotype plates, from which are printed 20 sizes of English Bibles, and 10 sizes of the New Testament, each size is bound in from four to six styles, as there is a demand for Bibles of all sizes in fine bindings, but the greater proportion of all issues is in plain style and is circulated among the poor. The whole Bible has been stereotyped at great expense in the Boston raised letter for the use of the blind. It also has plates in the New York point print and in the American Braille. About 26,000 volumes of the former and 16,000 of the last two have been circulated, in large measure gratuitously. By the charter and the constitution of the society it is restricted, as the British and Foreign Society has been, to the circulation of the Holy Scriptures

without note or comment. Like the British and Foreign Society also, the American Society has been restricted by its constitution to the publication in English of the Authorized Version only, but this restriction is now removed sufficiently to allow the publication of the Revised Version, which is now issued under an arrangement with the owners of the copyright. The government of the society is intrusted to a board of managers, consisting of 36 laymen, one-fourth of whom go out of office each year, but are reeligible. Laymen who were constituted directors for life before June 1, 1877 (by the payment of \$150), and ministers who are life members (by the payment of \$30) are authorized to attend the meetings of the board, with power to speak and vote. This brings into connection with the lay managers a certain number of ordained ministers, and laymen and ministers serve on its various committees, to whom are intrusted the departments and branches of its work. The Committee on Versions is composed of eminent ministers representing various different Christian denominations, and all new translations offered for publication must first receive the approval of the Committee on Versions.

The constant aim of the American Bible Society, as of its elder sister, the British and Foreign, with which it has ever labored in the closest official friendship, has been to secure the adequate translation of the Holy Scriptures into all the languages of the earth and to distribute these translations as widely as possible and especially to reach the destitute of all classes and conditions. For this purpose it has often initiated and supported new translations or revisions of existing translations, and its books are by fixed rule sold at cost prices as a maximum, and at much less than cost in many cases, and often given away to the very poor. At first its energy was naturally directed to a thorough supplying of the needs of the United States. Four times it has undertaken to canvass the whole country for this purpose. These canvasses were begun in 1829, in 1856, in 1866, and in 1882, and they occupied altogether many years. During the fourth resupply, beginning in 1882, more than 6,300,000 families were visited by its colporteurs, and 473,806 families were supplied with the Scriptures, and in addition, nearly 300,000 individuals, in 27 languages, including Welsh, German, Dutch, Norwegian and Danish, Swedish, Italian, Finnish, Hungarian, Bohemian, and Chinese. The immigrant populations, the negroes of the South, and other needy classes, it has sought to help. In 1912 it issued Scriptures for use in the United States in 83 languages besides English.

With the development of the country, during the progress of the century, the foreign work of the society has come into greater relative prominence than its work at home. During the last 30 years its foreign circulation has steadily increased, rising from less than 250,000 copies in 1876 to 2,224,099 copies in the year 1912. It has by large grants, both of money and books, aided missionary labors of the various Christian churches having missions in foreign lands, to prosecute Bible translation and distribution, entering fully into the foreign-mission enterprise and sharing its enthusiasm. It has now 12 regular foreign agencies under its own direction, each under the direction of an ordained minister of the Gospel—the La Plata Agency (including Argentina, Uruguay, Paraguay, Bo-

livia, Chile, Peru, and Ecuador), Brazil, Venezuela, Central America, Mexico, the West Indies, Levant (including Bulgaria, Turkey, Syria, and Egypt), China, Siam and Laos, Japan, Korea, and the Philippines. Besides these agencies under its own direction, it aids in Bible circulation by means of missionary and other correspondents, in Norway, Sweden, Russia, France, Germany, Switzerland, Spain, Italy, Austria, Africa, Arabia, Persia, India, Hawaii, Micronesia, and other countries. The scope and magnitude of its operations are exhibited by the following table

BIBLE SOCIETY ISSUED	Bibles	New Testaments and portions
1810-1825	251,642	187,938
1825-1850	2,673,826	4,459,561
1850-1875	6,786,200	18,766,539
1875-1900	9,156,615	39,701,153
1900-1913	6,793,603	25,471,673

It will thus be seen that its total issues during a period of 97 years have exceeded 98,000,000 volumes, and its total receipts during the same period have been somewhat over \$36,000,000. During the last 30 years its circulation in foreign lands has reached a total of 18,039,376 copies—at the present time the majority of its publications being sent to foreign countries. In 1905 it had 428 persons under its direction in the home field and 810 in foreign lands, as Bible distributors.

Its circulation at home and abroad, for its last fiscal year (1913), was 4,049,610 Bibles, Testaments, and portions. These figures, however, are only a partial index of the extent and variety of its labors. It has aided, during its existence, in the translation, printing, or distribution of the Scriptures in more than 100 different languages. At the present time translations and revisions are proceeding under its patronage in various languages in mission lands, notably in Spain, Brazil, China, Siam, South and West Africa, and the Philippine Islands.

In addition to the printing done in the Bible House, in New York, in 1912, it had Scriptures printed for its use at Shanghai and other cities in China, at Yokohama, at Constantinople, at Beirut, and at Bangkok. Translations have been begun, and in part published, in several of the many languages spoken in the Philippine Islands. In these new territorial possessions of the United States, as well as in Cuba and Porto Rico, the society finds a field peculiarly suitable for its labors.

THE AMERICAN AND FOREIGN BIBLE SOCIETY was organized by the Baptists, who desired that translations of the Bible in foreign lands should conform as nearly as possible to the original Hebrew and Greek. In this they had mainly in view the rendering of *Sacris* by *immense* instead of *baptize*. In the circulation of the English Scriptures they were willing that for a time the Authorized Version should be used. In 1850 a portion of the denomination, dissatisfied with this course, formed "The American Bible Union," whose object, as set forth in its constitution, is "to procure and circulate the most faithful versions in all languages throughout the world." It has done much in foreign lands, and, with the assistance of scholars both in Europe and America, was engaged in revising the Authorized Version. In 1883 the Bible con-

vention held by the Baptists at Saratoga, N. Y., decided that the American Baptist Publication Society should henceforth do the work of publication and circulation for the American and Foreign Bible Society and the American Bible Union, which still maintain their legal existence on account of certain legacies and other funds. The most of the money goes for the distribution of the Scriptures. The Bible Union revised the entire New Testament and portions of the Old—the Pentateuch, Job, Psalms, and portions of other books. The original revision was itself revised, and the Old Testament parts again revised. The revision was completed in 1912.

BIBLIA PAUPERUM (Lat. Bible of the poor). A sort of picture book of the Middle Ages, giving, on from 40 to 50 leaves, the leading events of human salvation through Christ, each picture being accompanied by an illustrative text or sentence in Latin or, later, in vernacular. A similar and contemporaneous work on a more extended scale, and with the legend or text in rhyme, was called *Speculum Humanae Salvationis*, i. e., the 'Mirror of Human Salvation.' The redemption by Christ is the central idea of this collection, so that the Old Testament subjects are chosen for their typical significance. Before the Reformation these two books were very popular among both the clergy and the laity. Owing to this general popularity, the printed copies were soon worn out and are now very rare. Many manuscripts of it and of the *Mirror of Salvation*, several as old as the thirteenth century, are preserved in different languages. The pictures of this series were copied in sculptures, in wall and glass painting, altarpieces, etc., and thus became of importance in the art of the Middle Ages. In the fifteenth century the *Biblia Pauperum* was perhaps the first book that was printed in the Netherlands and Germany, first with blocks and then with types. The chief proof for the discovery of printing in Haarlem rests on the first impressions of the *Speculum Humanae Salvationis*. The *Biblia Pauperum* has been several times reprinted in facsimile, e. g., London, 1884 (by Unwin, with preface by Dean Stanley).

BIBLICAL CRITICISM. Under this term are included two distinct departments of biblical investigation, Textual Criticism and Historical Criticism, each of which is defined according to the object in view.

1 **Textual Criticism** has for its object the determination of the true text of the biblical writings, i. e., the text as it stood in the autographs. Since these are no longer extant, the textual critic must carefully examine the various existing witnesses to the text, such as manuscripts in the language of the autographs, manuscripts of versions, especially of the more ancient ones, and quotations found in the writings of ancient authors. On the basis of such an examination, conducted in accordance with certain well-defined principles, the critic seeks to reconstruct the text of the autographs. The principles governing textual criticism are the same for all ancient writings, biblical or secular. The difference between the textual criticism of the Old and New Testaments is due mainly to the different character and quantity of the evidence for the respective texts. For the New Testament the manuscripts are more numerous, and in many instances nearer the autographs than is the case for the Old Testament. But the principles are essentially the same in both cases.

For the principles of textual criticism, as applied to the New Testament, see BIBLE, *Text of the New Testament*

2 **Historical Criticism** has for its object the determination of questions concerning the date, authorship, genuineness, composition and character of the biblical writings. If it seems to find that some of the books of the Bible are of composite origin, it seeks to ascertain the facts as to the sources from which they were derived, i.e., their age, original form, and general character and worth. These and similar questions are important and, as biblical science stands to-day, imperatively demand answers. It is true that tradition furnishes answers to such questions, but modern biblical study is not content to take the dicta of tradition, unsupported by other evidence. The evidence which it is the object of historical criticism to obtain is almost entirely internal, furnished by the writings under investigation. Such criticism is, of course, not confined to biblical study, but is recognized as indispensable to the proper investigation of all ancient literary productions. In order to form a judgment as to the date, authorship, and general character of a writing, the critic is careful to observe all the phenomena that the contents of the writing present.

Historical criticism, concerning itself with the relative age of the various parts of a book or a smaller section, may profitably employ a literary method, noting all peculiarities of style, such as vocabulary, idioms, and literary forms. It is sometimes found that different sections in the same book differ in marked degree from each other in these respects, and the question at once arises whether these differences point to different authorship of such sections. If so, it would imply that the book under investigation is of composite authorship. The whole question of the sources of certain biblical books thus becomes a matter of serious inquiry. The use of this literary method also enables the critic to form a tentative judgment as to the style peculiar to a given author, furnishing a standard of comparison to be applied to sections or books of uncertain authorship to determine whether they may be assigned to a writer whose style is known. Sometimes the employment of this method is designated as literary criticism. Its purpose, however, is historical, though the necessarily subjective character of its judgments makes it possible for the historian to use them only with much caution.

The method that gives the greatest assurance to the historical student is based on the observation that literary productions generally contain some indications of the age and surroundings in which they originate. The critic seeks to detect all such explicit or implicit historical allusions and to pass judgment on their significance. Where the indications are clear and positive, a conclusion is easily reached. Where there is only silence—i.e., no such indications—it is only in rare instances that the silence can be safely interpreted as showing that a certain work did not originate in a given age. The argument *e silentio* is always precarious.

Among the indications of age on which historical criticism to some extent depends are the thoughts and sentiments expressed. There is often a circle of ideas belonging unmistakably to a certain document, or author, or age. From the undoubted productions of a given author or age, conclusions may be reached as to the

ruling theological or other conceptions belonging to such an author or period. The conclusions so reached may then be used as tests to be applied to writings of uncertain age and authorship. The application of this test is a matter of delicacy, and conclusions based upon it are apt to be somewhat insecure.

The history of Biblical Criticism is as old as the attempts by thoughtful readers to solve the problems presented by the Bible itself concerning the integrity of the text, the authorship, date, and composition of the various books, and the character of their contents. There has probably not been a generation that has not contributed something of value to the development of this science. But the marked advance in modern times is largely the result of a greater determination to make the biblical books themselves answer the questions as to their origin and nature, without undue influence of traditional opinions.

It is doubtful whether any scholar has done more for the textual criticism of the Old Testament than Origen. In his *Hexapla* he not only followed the rules of Aristophanes of Byzantium and Aristarchus of Samos and applied their methods of sifting the testimony of the manuscripts and indicating defects and excrescences, but also furnished invaluable material for the comparison of copies of an original text with its versions. To recover the extant remnants of this great work is one of the chief ends of textual criticism in this field. Ximenes, Montanus, Le Jay, and Walton, in their great polyglots, provided a more extensive apparatus in the sixteenth and seventeenth centuries. The discussion between the Buxtorfs and Mornin and Cappel as regards the age of the vowel points, in which the latter proved to be right, was of epoch-making significance. The legitimacy of using the evidence of the versions is now generally acknowledged, and only the extent to which resort may be had to conjectural emendation, based on the requirements of the sense or metrical considerations urged in recent years, is still questioned. Emphasis has recently been put upon the necessity of applying the same canons of textual criticism that are followed in the case of other books to the Pentateuch as well, where many adherents of the current system of critical analysis strongly insist upon a greater integrity of the Hebrew text. In the field of New Testament textual criticism the dependence upon the great uncial codices on the part of excellent critics like Griesbach, Lachmann, Tregelles, Tischendorf, Westcott, and Hort has been modified by a greater attention to the cursive manuscripts and especially the early versions to which the discovery of the Sinaitic Syriac has given a fresh impetus.

The methods and results of literary and historical biblical criticism have never been quite unaffected by theological or philosophical considerations. This may be seen in the beginnings of such criticism by Philo, who frankly acknowledged many of the difficulties in the Pentateuch, but was led by his theory of inspiration to explain them away through the allegorical method, by the Gnostics, who observed many peculiarities of a purely literary character, but also permitted their conception of history and their theology to guide them in the discrimination between original elements and later additions, and by the Antiochene exegetes, who reached many advanced positions

on literary and historical grounds, as in the case of Canticles and Daniel, but could not altogether free themselves from the tendency to allegorization. The early Baptists and Unitarians dealt with many questions concerning canonicity and the authorship of books both in the Old and the New Testament in a searching manner, but their knowledge of history and of true critical principles was defective and their dependence on "the inner light" deprived them to some extent of the steady influence of a mastered and carefully sifted tradition. This judgment also applies to the deists and rationalists of the old school, whose reaction against traditional views often led them to a fanciful interpretation and a failure to appreciate historic facts. Many important forward steps, such as that taken by Astruc, were inspired by apologetic motives, and, while their suggestive value in justifying investigation has been very great, they have not seldom, under closer examination, been seen to involve moves in the wrong direction (See PENTATEUCH). Similarly, the vast strides towards a more comprehensive historical criticism made by Reuss, Vatke, and George, by Baur and his school, by Strauss, and by Bruno Bauer were more or less consciously influenced by an indiscriminating allegiance to Hegel's philosophy. Even the latest phase of criticism represented by Kuenen, Williamson, Stade, Duhm, and Cheyne, by the Ritschlian school, and by many independent scholars of to-day, has been affected to such an extent by the general acceptance of a philosophy of evolution as to give the impression that purely literary and historical questions are sometimes decided by what, in the judgment of the interpreter, must, on a priori grounds, have been the course of development. While it is manifestly undesirable that the investigator should pursue so exclusively one line of research as to cause him to forget the necessary coordination, and the best results are achieved when the student has not only mastered the technique of his special craft but also is an independent thinker, aware of the larger bearings of every new discovery or new theory advanced, it is nevertheless true that the most hopeful signs of the times in Biblical Criticism are the increasing rigidity of the methods employed in every branch of this great study, the willingness to undertake careful and prolonged examinations of minute details, the readiness to hold opinions tentatively and subject to revision, the fairness in considering every new hypothesis proposed for the explanation of the facts, the urgent demand for satisfactory proofs, and the growing conviction that every long-cherished tradition, whatever its nature, must be studied profoundly and with respect before it is either accepted or rejected. True Biblical Criticism is in its purpose and nature neither destructive nor constructive, it does not seek to destroy any old tradition nor to build up a new one that may impose its authority on men. Its sole aim is to find the truth, and that is a process which can never cease unless the human mind becomes wholly nihilistic, i.e., insensible to the highest realities in life. Against such an issue one of the surest preventatives is an honest and reverent scientific study of the Bible.

Bibliography. The various *Introductions* to the whole or parts of the Old and New Testaments contain accounts of the biblical criticism. In addition, consult such special treatises as the following: J. Wellhausen, *Prolegomena zur*

Geschichte Israels (5th ed., Berlin, 1899); W. R. Smith, *The Old Testament in the Jewish Church* (2d ed., Edinburgh, 1892); T. K. Cheyne, *Founders of Old Testament Criticism* (London, 1892); A. C. Zenos, *The Elements of the Higher Criticism* (New York, 1895); M. W. Jacobus, *A Problem in New Testament Criticism* (New York, 1900); H. S. Nash, *The History of the Higher Criticism of the New Testament* (New York, 1900); Sir R. Anderson, *The Bible and Modern Criticism* (London, 1905); Orr, *The Problem of the Old Testament Considered with Reference to Recent Criticism* (1906); C. F. Kent, *Origin and Permanent Value of the Old Testament* (1911).

BIBLIOGRAPHY. A term which was first used, according to its original meaning, to denote the transcription of books. After the publication of the first volume of DeBure's *Bibliographie Instructive* in 1763, it was used to signify the proper description of books, and concerned itself with authorship, printing place, and date of publication, editions, rarity, history, and external beauties of books. With the spread of popular education, the multiplication of books, and especially with the modern development of libraries and the book trade, the term "bibliography" has come to be used in a still more practical sense, as concerning itself with the contents of books. The most useful modern bibliographies are those of special countries, those concerning any one considerable branch of knowledge, and bibliographies of individual authors. Allied to them are bibliographies of anonymous and pseudonymous works. Subject indexes to periodicals or society transactions may also be regarded as bibliographic.

A favorite dream of bibliographers has always been the production of a catalogue which would cover the whole realm of printed books. The most notable, though not the earliest, attempt of this sort was that of Conrad Gesner, who published at Zurich his *Bibliotheca Universalis* (4 vols., 1545-55). In one alphabet he recorded, under the names of the authors, all the books in the Hebrew, Greek, and Latin languages about which he could obtain information. Since Gesner's time there have been many others who have attempted to make a universal catalogue, among them Dr. Robert Watt, of Edinburgh, who prepared the *Bibliotheca Britannica* (4 vols., 1824). But the latter's work, in respect to foreign books, is selective and not universal. Its greatest use, in spite of some inaccuracies, is in connection with British works. The other general bibliographies of greatest utility are the following: Brunet, *Manuel du libraire et de l'amateur de livres* (5th ed., 6 vols., Paris, 1860-65, supplement, including a *Dictionnaire de géographie*, 3 vols., 1870-80); Giese, *Trésor de livres rares et précieux* (7 vols., Dresden, 1859-69); Ebert, *Allgemeines bibliographisches Lexikon* (2 vols., Leipzig, 1821-30). An English translation was published under the title *General Bibliographical Dictionary* (4 vols., Oxford, 1837). The library of the British Museum has so large a collection of books that its *Catalogue of Printed Books* (108 vols., London, 1881-1905) serves as the most important of the general bibliographies. Bibliographical literature has increased to such proportions that a large number of extensive works have been published, simply to enumerate them. The most famous of these is Petzholdt's *Bibliotheca Bibliographica* (Leipzig, 1866).

Henri Stein's *Manuel de bibliographie generale* (Paris, 1897) uses the material of Petzholdt, revising it and bringing it up to date. Of even greater value to the general reader is the published *List of Bibliographical Works in the Reading Room of the British Museum* (1889), while the latest and for ready reference the most useful of all such lists is William Pideaux Courtney's *Register of National Bibliography* (2 vols., London, 1905, vol. iii, supplement, 1912). These works have increased to such a number that the Bibliographical Society of Chicago printed as its first publication in 1901 A. G. S. Josephson's *Bibliography of Bibliographies Chronologically Arranged*, a second edition of which was issued in 1910-11 by the Bibliographical Society of America in its *Bulletin*, vol. ii-iv, and *Papers*, vol. vii.

For the general purposes of the ordinary student, bookseller, and librarian, the book trade bibliographies of the various countries are of most service. In the case of American books, the series of the *American Catalogue* and its supplements will be sufficient for most cases. Beginning with the books in print in 1876, 9 volumes cover the field to 1910. Annual volumes were published from 1886 to 1911, and the *Publisher's Weekly* keeps the record up to date. Part of this period is covered even more completely by the *United States Catalogue* of books in print (1st ed., 1899, 3d ed. superseding all earlier editions, Minneapolis, 1912), its annual supplements since 1902 and its bimonthly supplement, the *Cumulative Book Index*. American publications before 1870 are still very incompletely listed. Evans's *American Bibliography, 1639-1820*, is excellent as far as it has been issued (vols. i-vii, covering the years 1639-1789, Chicago, 1903-12), but for the period 1820-70 Rootbach's *Bibliotheca Americana 1820-61*, and Kelly's *American Catalogue of Books Published in the United States, 1861-1871* (2 vols., New York, 1866-71) furnish only partial lists. The *Publisher's Trade List Annual* is indispensable when publishers' lists are needed. *American Book Prices Current*, a record of books, manuscripts, and autographs sold at auction since 1894, is published annually, and is exceedingly valuable as giving the fluctuating prices of out-of-print books. Both English and American books are included in Allison, *Critical Dictionary of English Literature* (3 vols., 1859-72), with supplement (2 vols., Philadelphia, 1897).

For books printed in England 1837-1910 there is the *English Catalogue* (8 vols., London, 1864-1911), since 1837 an annual catalogue has been issued. *The Reference Catalogue of Current Literature* (well indexed), published every four years, is the standard collection of publisher's lists. For the earlier period of British publications, Watt's *Bibliotheca Britannica* (4 vols., 1824) and Lowndes's *Bibliographer's Manual of English Literature* (new ed. 11 vols., 1857-64) are the chief authorities, although neither is a complete record and the former is often inaccurate. More dependable for the periods covered are the *Transcript of the Register of the Company of Stationers of the City of London, 1556-1640*, edited by Edward Aiber (5 vols., London, 1875-94), and Aiber's *Term Catalogues, 1668-1709* (3 vols., London, 1903-1906), Bent's *General Catalogue of Books, 1700-1786* (London, 1786), his *London catalogue, 1786-1811*, and Hodgson's *London Catalogue, 1816-51* (London, 1851) give only brief and imperfect records

For the prices of books sold at auction in England *Book Prices Current*, published annually since 1886, may be consulted. The *Publishers' Circular* gives weekly and monthly lists.

The principal trade catalogue of France is that of Lorenz, entitled *Catalogue général de la librairie française* (24 vols., Paris, 1867-1913). It covers a period from 1840 to 1912. Since 1893 a *Catalogue annuel* has been published, edited by D. Jordell. The weekly *Bibliographie de la France* has been issued since 1811. Le Souder's *Bibliographie française, 2 série* (2 vols., Paris, 1908-11), is an excellent five yearly record of books published since 1900, and Federn's *Répertoire bibliographique de la littérature française des origines à 1911* is a useful selected list (Leipzig, 1913). The earlier literature of France is best traced in Brunet's *Manuel* and Querard's *La France littéraire* (12 vols., 1827-64) and its supplements (6 vols., 1842-57).

There are two very extended series of German trade bibliographies, that of Hensius, *Allgemeines Bucher-Lexicon* (Leipzig, 1812-94), covering the period 1770-1892 in 19 vols., while that of Kayser, *Vollständiges Bucher-Lexicon* (Leipzig, 1834-1910), covers the period 1750-1898, in 36 vols. For many years Hinrichs has published at Leipzig catalogues covering five-year since 1851 and half-year periods since 1797.

The best means of tracing modern Italian publications is in the *Catalogo generale della libreria italiana* (3 vols., Milan, 1901-05, subject index, 1910-), supplement for 1900-10, 1911-), and in the *Bollettino delle pubblicazioni italiane*, a monthly list published by the National Central Library of Florence.

To look up Spanish publications one needs Hidalgo's *Diccionario general de bibliografía española* (7 vols., Madrid, 1862-81) and the monthly *Boletín de la librería*, which has been published since 1873. For earlier books, Antonio's *Hispania nova 1500-1681* (2 vols., Madrid, 1733-88) should be used. The authority for Portuguese books is Silva's *Diccionario bibliografico portuguez* (16 vols., Lisbon, 1868-93), this also covers Brazilian works.

Among numerous works published in Belgium, mention need only be made of the *Bibliographie nationale 1830-80* (4 vols., Brussels, 1886-1910) and of the monthly *Bibliographie de la Belgique*. In Holland the name of Binkman stands for the series of catalogues which he has published at Amsterdam, including *Naamlijst van boeken sedert 1799 tot 1819* (Amsterdam, 1835-68) and *Catalogue van boeken 1830-1910* (Amsterdam, 1883-1913).

For the literature of Denmark the chief authorities are Bruun's *Bibliotheca Danica, 1482 til 1830* (3 vols., Copenhagen, 1872-96) and the series *Dansk Bogfoiøgnelse, 1841-1900* (5 vols., Copenhagen, 1891-1903). In Sweden the series of Bibliog's *Svensk Bok-Katalog* and its supplements covers the years 1866-1905 (5 vols., Stockholm, 1878-1910).

In addition to these national bibliographies, practically every science has its own bibliography. Reference may be made here to some of the more important ones, principally published in Germany. For astronomy, Houzeau and Lancaster, *Bibliographie de l'astronomie* (Brussels, 1882-87), for botany, Pritzl, *Thesaurus Literaturæ Botanicae* (Leipzig, 1872), for chemistry, Bolton, *Select Bibliography of Chemistry, 1492-1897* (Washington, 1893-1901, suppl. 2 vols., 1899-1904), for archaeology, Hubner, *Bibliographie*

der klassischen Altertumswissenschaft (Berlin, 1889), for Greek and Latin literature, Engelmann, *Bibliotheca scriptorum classicorum*, 8th ed by Preuss (2 vols, Leipzig, 1880-82), together with its continuation for the period 1876-96, by Klusmann (2 vols in 4, Leipzig, 1909-13), for French literature, Lanson, *Manuel bibliographique de la littérature française* (4 vols, Paris, 1909-12), and Thème, *Guide bibliographique de la littérature française de 1800 à 1900* (Paris, 1907), for German poetry, Goedeke, *Grundriss zur Geschichte der deutschen Dichtung* (vols 1-x, Dresden, 1884-1910), for fiction, Baker, *Guide to the Best Fiction* (New York, 1913), for comparative literature, Betz, *La Littérature comparée, essai bibliographique* (2d ed, Strassburg, 1904), for American history, Lained, *Literature of American History* (Boston, 1902), and Channing and Hart, *Guide to the Study and Reading of American History* (Boston, 1912), for English history, Gross, *Sources and literature of English History to 1855* (London, 1900), for French history, Molmer, Hauser, and Bourgeois, *Sources de l'histoire de France* (vols 1-x, Paris, 1901-13), and Caron, *Bibliographie des travaux publiés de 1866 à 1897 sur l'histoire de France depuis 1789* (Paris, 1912), for German history, Dahlmann-Waltz, *Quellenkunde zur deutschen Geschichte* (8th ed, Leipzig, 1912), for medieval history, Chevalier, *Répertoire des sources historiques du moyen âge* (4 vols, Paris, 1894-1906), and Potthast, *Bibliotheca historica medii ævi*, *Wegweiser durch die Geschichtswerke des europäischen Mittelalters* (2d ed, 2 vols, Berlin, 1896), for the political and social sciences, Mühlbrecht, *Wegweiser der Rechts- und Staatswissenschaften* (2d ed, 2 vols, Berlin, 1893-1901), Stammhammer, *Bibliographie der Sozialpolitik* (2 vols, Jena, 1896-1912), his *Bibliographie der Finanzwissenschaften* (Jena, 1903), and his *Bibliographie der Socialismus und Communismus* (3 vols, Jena, 1893-1909), for philosophy and psychology, Rand, *Bibliography of Philosophy, Psychology, and Cognate Subjects* (2 vols, New York, 1905), for science, Royal Society of London, *Catalogue of Scientific Papers* (12 vols, London, 1867-1902, subject index, vols. 1-11, 1908-12).

For certain subjects the best bibliographies are not in separate form, but are appended to some other work, e.g., the bibliographies of English literature in the *Cambridge History of English Literature*, of theological and religious topics in the *New Schaff-Herzog Encyclopedia of Religious Knowledge*, the *Catholic Encyclopedia*, the *Dictionnaire d'archéologie Chrétienne*, etc., and of general and modern history in the *Historie générale* by Lavisse and Rambaud, and the *Cambridge Modern History*. Bibliographies of individual authors especially, are often included either in standard biographies or in standard editions of their collected works. Consult, e.g., the excellent bibliographies appended to all volumes in the *Great Writers Series*, and the very extensive bibliography of Thackeray in the *Life of Thackeray* by Lewis Melville (2 vols, London, 1910). New bibliographies, which appear in great numbers every year, are listed in the *Library Journal*, in the *Bulletin of the American Bibliographical Society*, and especially in the *American Library Annual*.

Quite as important as the large comprehensive subject bibliographies are the annual summaries or bibliographical surveys of the current literature of special subjects which serve the

double purpose of a list of new books and an index to the periodical literature on the subject. Bibliographies of this type are published principally in Germany, and their growth has been especially evident during the latter part of the nineteenth century. It would be impossible to list all such surveys here, as practically every branch of knowledge has its annual bibliography or *Jahresbericht*. Some of the best known are for astronomy, *Astronomisches Jahrbuch* (Berlin, since 1899), for chemistry, *Jahresbericht über die Fortschritte der Chemie* (Giessen, since 1861), classical philosophy, *Bibliotheca philologica classica* (Buln, since 1873), for education, *L'Année pédagogique* (Paris, since 1911), for geography, *Bibliotheca geographica* (Berlin, since 1902), and *Bibliographie géographique annuelle* (Paris, since 1893), German philology, *Jahresbericht über die Erscheinungen auf dem Gebiete der germanischen Philologie* (Berlin, since 1879), German literature, *Jahresbericht für neuere deutsche Literaturgeschichte* (Stuttgart, since 1892), for history, *Jahresbericht der Geschichtswissenschaft* (Berlin, since 1878), for American history, *Writings on American History* (New York and Washington 1902-03 and since 1906), for French history, *Répertoire méthodique de l'histoire moderne et contemporaine de la France* (Paris, since 1898), for German history, Masslow, *Bibliographie zur deutschen Geschichte* (Leipzig, since 1898), for philosophy, *Philosophie der Gegenwart* (Heidelberg, since 1908), and *Bibliographie de la philosophie française* (Paris, in *Bulletin de la Société française de philosophie*, since 1909), for psychology, the *Psychological Index* (New York, since 1894), for Romance philology and literature, *Kritischer Jahresbericht über die Fortschritte der romanischen Philologie* (Munich, since 1892), for the social sciences, *Bibliographie der Socialwissenschaften*, a monthly list with annual indexes (Dresden and Berlin, since 1905), for science, *International Catalogue of Scientific Literature* (London, since 1901), for theology, *Theologischer Jahresbericht* (Brunswick, since 1882).

There are numerous societies organized for the encouragement of bibliographical research and the publication of bibliographies. Some of the more important of these, with the dates of founding, are: Bibliographical Society, London, 1892, Bibliographical Society of America, 1904, Institut International, Brussels, 1895, the Deutsche bibliographische Gesellschaft, 1906, Gesellschaft der Bibliophilen, 1899, Société française de Bibliographie, 1906.

Numerous bibliographies of anonymous and pseudonymous works have appeared from Geisler (1671) and Placcius (1674) down to the present day. (See ANONYMOUS.) Poole's *Index to Periodical Literature* covers, for the nineteenth century, a vast number of articles which have never appeared in book form. Consult, for information on national bibliography, A. Crowell, *Three Centuries of English Book-trade Bibliography* (New York, 1903), R. A. Poole, *National bibliographies* (London, 1912), New York State Library, *Selected National Bibliographies* (Albany, 1908), for help in the selection of best books, Sonnenschein, *Best Books & Reader's Guide to the Choice of the Best Available Books*, about 100,000 (3d ed, parts 1-11, New York, 1910-12) and the *A. L. A. Catalog, 8000 Volumes for a Popular Library* (Washington, 1904, Supplement, Chicago, 1912), for additional

titles of subject bibliographies, John Crerar Library, *List of Bibliographies of Special Subjects* (Chicago, 1902)

BIBLIOL'OGY See BIBLIOMANIA

BIBLIOMANCY (Gk βιβλία, *biblia*, the Bible + μαντεία, *mantheia*, divination) Divination by means of the Bible. Divination by means of poetic verses, fixed on by chance, was common in the Roman world, and Veigil was frequently used for the purpose (*Sorites Vergilianae*). When Christianity had spread through Europe, the Bible naturally became the most valuable book of divination. The method was to open the Bible at random and observe the first passage which met the eye, to pick a passage by laying the finger or a pin on the open page, or to note the first words of the Bible heard after entering a church. Such chance passages were supposed to foretell the future or in some other way to convey a divine meaning. Writings of the church fathers or lives of the saints were also used. The conversion of St Augustine furnishes a classical example of bibliomaney. He seemed to hear a voice, "Take and read." Picking up a volume of the Epistles, he read Rom xii 13, the first passage his eye met, and took it as a direct message from God. Yet in a letter (lv, 1, 20) he deprecated the custom. Though frequently condemned, it was often openly used in the Church. The election of St Martin to the bishopric of Tours (371) was decided by the use of the Psalter. Prognostications regarding the administration of a newly elected bishop were often made in this way. Bibliomaney was prohibited, under pain of excommunication, if the person was a clergyman, by the sixteenth canon of the Synod of Vannes, in Brittany, A.D. 465, and by the synods of Agde, in South Gaul (506), in the forty-second canon, and Orleans (511), in the thirtieth canon. It continued, however, to prevail for many centuries thereafter, and is said to have been introduced into England at the Norman Conquest.

It has persisted into modern times and has been used by devout persons of all classes. In Tennyson's *Enoch Arden* the poet has made literary use of the custom, which was not uncommon among the class whose life the poem presents.

BIBLIOMANIA (Gk βιβλία, *biblion*, book + μανία, *mania*, madness) A word formed from the Greek to express the passion for rare and curious books, which has manifested itself to such an extent during the last two centuries. While the ordinary collector is satisfied with the possession of works which are valuable either on account of their established reputation or as assisting him in his literary or professional pursuits, the bibliomaniac or bibliophile is actuated by other motives. With him utility is of secondary importance, rarity being the first and great requisite. The history of the auction room reads like a romance. In 1812 occurred the famous sale of the library of the Duke of Roxburghe. Among the treasures which that library contained was the only perfect copy known to exist of the first, or at least the first dated, edition of Boccaccio's *Decameron* (Venice, Christ Valdarfer, 1471). After a spirited competition with Lord Spencer the Marquis of Blandford purchased this volume for the sum of £2260—probably the highest price ever paid up to that time for a single book. One of the results of the sale was the establishment of

the Roxburghe Club (1812), the object of which was to reprint, for the use of the members only, works hitherto unedited or of extreme rarity. The example thus set was speedily followed by the Bannatyne and Maitland clubs in Scotland and by many more in other parts of Great Britain. In 1884 the Grolier Club was established in New York City. The books most sought after by American collectors may be classed as follows: the earliest printed books and the first editions of the classics, first editions of the books of English writers of the sixteenth and seventeenth centuries, especially the poets and dramatists, first editions of the books of the great nineteenth century writers in England and America, books relating to America, more especially the narratives and accounts of the earliest explorers and colonizers, and the first books printed at American presses. A copy on vellum of the first book ever printed, the *Bible in Latin*, in 2 vols., printed 1450-55, by Gutenberg and Fust, brought £4000 at the sale of Lord Ashburnham's library in 1897, but a copy on paper for which £3950 had been paid in 1884 brought only £2860 when resold in 1898. A copy of the *Latin Psalter* printed by Fust and Schoeffer (1459) brought £4960 in 1884, still the highest price ever paid at auction for a printed book. A second copy of the same book sold in 1904 for £4000. The few books printed by Caxton which come upon the market bring very high prices. A copy of the *Royal Book* (1487) sold in 1902 for £2225. Since 1900 there has been a marked increase in price of the Shakespeare folios and the early quarto editions of the separate plays. In 1905 the sum of £10,000 was paid for a fine set of the four folios, 1623, 1632, 1664, and 1685, at private sale, though they had never brought a greater aggregate sum than £3380 at auction. In the same year £2000 was paid for the first edition of *Titus Andronicus* (1594), £1750 for *Richard III* (1605), £1650 for *Much Ado About Nothing* (1600), and £1000 for Part I, *Henry IV* (1608). The first was at private sale, the last three at auction. The rarest pieces by the great modern poets bring prices equally surprising. Shelley's first volume of verse, *Original Poetry by Victor and Cazire* (1810), brought £800 in 1903, and in 1900 £2050 was paid at auction for a copy of Poe's first book, *Tamerlane and Minor Poems* (1827). The most valuable American printed book is no doubt the first collection of the *Laws of the Colony of Massachusetts Bay*, printed in 1648 at Cambridge on Daye's Press. Though it was known to have been printed and was diligently sought for, no copy was known to have survived to modern times until one was discovered in 1906. The books printed at the Kelmseott Press, which sold at such extremely high prices just after the death of William Morris, have again fallen in value, as have the first editions of some modern writers, notably Stevenson and Kipling.

The word "bibliomaniac," too suggestive of madness, is being displaced by *bibliophile* (lover of books), while "bibliophage" means one who is a collector of beautiful or unusual bindings. Consult: *Book-Prices Current* (London, 1887-), Livingston, *American Book-Prices Current* (New York, 1895-), Dibdin, *Bibliomane* (London, 1811), Fitzgerald, *The Book Fancier* (London, 1886), A. Lang, *The Library* (London, 1881), Burton, *The Book-Hunter* (New York, 1882), E. Field, *The Love Affairs*

of a *Bibliomaniac* (New York, 1896). F S Merryweather, *Bibliomaniac of the Middle Ages* (London, 1849), reprint with introduction by C Orr (New York, 1900). Feigelson, *Some Aspects of Bibliography* (Edinburgh, 1900). Pollard, *Fine Books* (New York, 1912). In the United States especial note is made of Fletcher's *An Index to General Literature* (Boston, 1901), and of the elaborate volumes of Poole's *Index to Periodical Literature*, which, with different successors of like purpose, covers the period from 1802 to 1914. Reference may also be made to Gustave's *Guide to Periodical Literature* in two massive volumes (Minneapolis, 1910). There are special bibliographical indexes of books on special subjects. These are noted under the proper heads, as ART, HISTORY, ETC.

BIBLIOPEGE, bíb'li-o-pěj (Gk βιβλίον, *biblion*, book, and πήγνυμι, *pēgnymī*, to bind) See **BIBLIOMANIA**.

BIBLIOTHÈQUE DE SAINTE GENEVIÈVE, be'bli-o-těk'de sánt zhán'yvè' (Fr library of Ste Genevieve) A Paris library in the Place du Panthéon. Its contents once made up the Ste Genevieve Library, which was founded in 1624 by La Rochefoucauld, became national property in 1790, and was transferred to the present edifice, built by Labrousse, in 1850. It contains 35,000 manuscripts, over 5000 engravings, and 125,000 volumes. Its most remarkable possession is its nearly complete collection of Aldines. See **LIBRARIES**.

BIBLIOTHÈQUE MAZARIN, ma'za'ri-n' (Fr Mazarin library) A library in Paris, in the first court of the Institut de France, founded by Cardinal Mazarin. It contains over 300,000 volumes and 5800 manuscripts, besides many interesting editions for the curious. See **LIBRARIES**.

BIBLIOTHÈQUE NATIONALE, ná'syó'-nal' The French National Library, in Paris, the greatest in France. In its four sections it contains over 2,600,000 printed volumes and maps, about 102,000 manuscripts, 150,000 coins and medals, and more than 250,000 engravings. The two chief sources of its origin were the Bibliothèque du Roi, arranged in 1367 by Charles V in the Louvre, and the library of the Orleans family at Blois. These libraries were united by Francis I at Fontainebleau, whence Charles IX transferred them to Paris and placed them in the Collège de Clermont. The library is now in the Rue Richelieu. A legal requirement decreed in 1536 that one copy of every work printed in France should be deposited in the National Library. See **LIBRARIES**.

BIB'LIS, or **BYBLIS** (BÍSLIS or BÚSLIS) The daughter of Miletus and Eudothia, and sister of Latmus, with whom she fell violently in love. After long and fruitless pursuit of him in many lands, she gave up in despair, and was, according to Ovid (*Metamorphoses*, ix, 450-665), changed into a fountain. Consult Fretter-Robert, *Die griechische mythologie*, i, 374, and Rohde, *Griechische Roman* (1896).

BIB POUT, or **WHITING POUT**, hwít'ing (so called from a bil-like membrane about its head) A small codlike (*Gadus luscus*), rather common on the British and Scandinavian coasts. It is seldom over a foot in length, with an unusually deep body for a cod, and is in the best condition in November and December. In Scotland it is called a "bass."

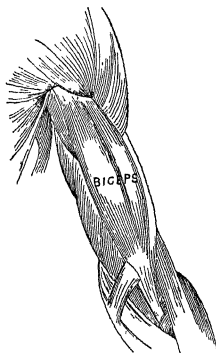
BIBRA, bí'bra, ERNST, BARON VON (1806-

78) A German naturalist and author. After completing the study of law at the University of Wurzburg he devoted himself to natural science and chemistry, traveled in South America, and on his return to Germany settled in Nuremberg. He published a number of works on chemistry, including *Chemische Untersuchungen über die Knochen und Zähne der Menschen und der Wirbeltiere* (Schwenfurt, 1844), *Chemische Fragmente über die Leber und die Galle* (Brunswick, 1849), *Die Bronzen und Kupferlegierungen der alten und ältesten Völker* (Erlangen, 1869). He also wrote numerous works of travel and fiction, including *Reisen nach Sudamerika* (2 vols, Mannheim, 1854), *Erinnerungen aus Sudamerika* (3 vols, Leipzig, 1861), *Reiseskizzen und Novellen* (4 vols, Jena, 1864), *In Sudamerika und in Europa* (2 vols, Jena, 1874).

RIBULUS See **CALPURNIUS**.

BICE, bí, or **BISE** (OF *bis*, fem *bise*, brown, dark, origin doubtful) A name given to two colors used in painting, tones of blue and green. Blue bice is known as *mountain blue*, *ongar o*, etc, and green bice as *Hungarian green*, *verde de Spagna*, etc. Both colors are native carbonates of copper, but as inferior kinds are artificially prepared, and as other pigments often pass under the same name, the word "bice" is of very doubtful value and has become, indeed, almost an obsolete term.

BICEPS (Lat double-headed, from *bis*, twice + *caput*, head) The muscle which gives a rounded appearance to the front of the arm. Above, it consists of two portions or heads, the



BICEPS OF ARM

short head being attached to the coracoid process of the scapula, the long head to the margin of the glenoid cavity, the depression which lodges the head of the humerus. They unite to form a fleshy belly, which terminates in a rounded tendon, and this tendon is inserted into the tubercle of the radius. (See **ARM**.) Before passing to this insertion, it gives off an expansion, which separates the median basilic vein from the brachial artery in the situation generally selected for venesection. The action of the biceps is to flex the forearm on the arm and to help supinate the hand.

The name is also given to a thigh muscle whose tendon forms the outer "hamstring." See **RIGHT**.

BICÊTRE, be'sâ'tr' (corrupted from *Winchester*), John, the Bishop of Winchester, was at the head of the hospital here. Originally, the name given an ancient castle, situated on an eminence to the south of Paris (Map Paris id vicinity). After having served as a prison id as a hospital, it has been converted into an insane asylum. A notable feature of the building is a well sunk in the rock to the depth of 53 feet. The village of Bicêtre surrounds it, id on the eminence is situated the modern port de Bicêtre.

BICHAT, be'sha', MARIE FRANÇOIS XAVIER (1771-1802). A French anatomist and physiologist. He studied in Paris under Desault, who quickly recognized his genius and befriended him. In 1797 Bichat became lecturer on anatomy, experimental physiology, and surgery, and in 1800 was appointed physician in the Hôtel-Dieu, but he soon broke down under the strain of intense and unremitting labor. Bichat is justly considered as the founder of general anatomy, he was the first to show that the different organic tissues and membranes in common—a fact which permitted him greatly to simplify and to systematize both anatomy and physiology. His principal work is *Anatomie générale, appliquée à la physiologie et à la médecine* (2 vols., 1801). In his *Recherches physiologiques sur la vie et la mort* (1800) he differentiates between what he terms organic life and animal life. The passions, as well as the various transformations constantly taking place in the living organism, constitute organic life, while animal life comprises the manifestations of pure intelligence. Death, hastened by Bichat's arduous labors in the dissecting room, interrupted his writing of an *anatomie descriptive* (2 vols., 1801-03). *Condillisme*, "Essai sur la philosophie de Xavier Bichat," *Archives d'anthropologie criminelle*, vol. xvi, pp. 753-825 (Paris, 1911).

BICHR, be-shér' (native name). A fish (*Polypterus bichir*) of the upper Nile and of some other African rivers, which is regarded as the best food fish of those waters. Three related species are known in other Central African rivers, dwelling in deep pools and apparently reaching over the surface of the ooze, where they feed on fishes and other aquatic animals (see **REED FISH**). These fishes are of particular interest as the few remaining representatives of the once very extensive Ganoid order *Crossopterygii* (see **GANOIDEI**). All the forms, fossil id recent, according to Kingsley, agree in having a diphycecal tail, the dorsal fin divided into two or more divisions, pectorals and ventrals with a scaly axis and fulcra absent from the throat. The throat is protected by two large plates, the scales are thin and cycloid or else thick and rhomboid—the latter in the living species. In the young bichir external gills are present, the mode of progression is interesting, as when creeping over the bottom the pad-like pectoral fins are used as limbs. These fish can live only one or four hours out of water, and then only when covered with damp weeds.

BICHLORIDE OF MERCURY. See **ANTIDOTE**.

BICK'ELL, GUSTAV WILHELM HUGO (1838-1906). A German philologist and theologian, born at Cassel. He studied in 1857-62 at Marburg and Halle. In 1867 he was consecrated a

priest of the Roman Catholic church and appointed a professor in the college at Munster. He became professor of Christian archaeology and Semitic languages at the University of Innsbruck in 1874, and in 1891 professor of Semitic philology at the University of Vienna. In addition to a translation of the poems of Ephraem Syrus, and an edition of the works of Isaac of Antioch, his publications include *Grundriss der hebraischen Grammatik*, Eng. trans. by Curtius (1869-70), *Conspicuum Rei Synonym. Litterariae* (1871), and *Messe und Pascha* (1872).

BICK'ERSTAFF, ISAAC, ASTROLOGER. A pseudonym adopted by Dean Swift in the pamphlet (1709) in which he proved that the well-known almanac maker, Partridge, was dead. The name was later adopted by Steele in his *Tatler* (1709-11).

BICK'ERSTAFFE, ISAAC (1735-1812). An Irish dramatist, author of numerous comedies and light musical pieces which were produced under Garrick's management and had great success. When 11 years old, he became page to Lord Chesterfield, then Lord Lieutenant of Ireland. Afterward he was an officer of marines, but was dismissed for some discredit offense. Under the suspicion of a capital crime, he took refuge abroad in 1772. Except that he lived for a time at St. Malo under an assumed name, nothing is known of his later life. His best-known pieces are *The Mad of the Mill* (1765), *The Padlock* (1768), *He Would if He Could* (1771), *Love in a Village* (1763), *The Hypocrite* (1768), *The Captive* (1769).

BICK'ERSTETH, EDWARD HENRY (1825-1906). An English Bishop and poet. He was born at Islington, son of Edward Bickersteth, was educated at Cambridge, and was ordained in 1848. He was in charge of parishes in various places until 1885, when he became the Dean of Gloucester. In 1885-1901, when he retired, he was Bishop of Exeter. He is an author of some distinction in prose and poetry. His eschatological poem, *Yesterday, To-Day, and For-ever* (London, 1866, 10th ed., 1889) has been reprinted and widely read. About 30 of his hymns are in popular use. Among the best known of these are "O Brothers, Lift Your Voices" and "Peace, Perfect Peace."

BICK'MORE, ALBERT SMITH (1839-). An American naturalist, born at St. George, Me. He graduated at Dartmouth in 1860, studied at Lawrence Scientific School (Harvard University) under Agassiz, and was an assistant in the Museum of Comparative Zoology. From 1865 to 1869 he traveled in the Malay Archipelago and eastern Asia and upon his return was for a short time professor of natural history at Madison (now Colgate) University. He was a founder of the Museum of Natural History in New York (see **MUSEUMS**) and became lecturer in charge of the departments of public instruction there in 1882. He held this post until 1904, when he resigned and was made professor emeritus. His publications include *Travels in the East Indian Archipelago* (1869) and other works.

BICK'NELL. A city in Knox Co., Ind., 13 miles east by north of Vincennes, on the Indianapolis and Vincennes Railroad, and on White River (Map Indiana, B 4). The town is in a productive coal region and has several mines. Pop., 1910, 2794.

BICKNELL, ERNEST PERCY (1862-). An American public official and reformer, born near Vincennes, Ind., and a graduate of Indiana

University. In 1887 he engaged in newspaper work in Indianapolis, in 1893 was appointed secretary of the Indiana Board of State Charities, in 1898 became general superintendent of the Chicago Bureau of Charities, and in 1908 was appointed national director of the American National Red Cross Society. He took an active part in many reform movements in Chicago and other cities, and was a representative of the American National Red Cross at San Francisco following the fire of 1906, and in Sicily and Calabria after the earthquake of 1909. In 1908 and 1909 he was president of the National Conference of Charities and Corrections.

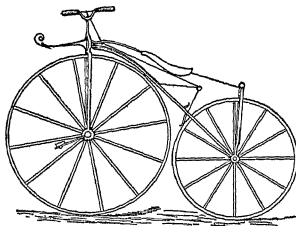
BICKNELL, GEORGE AUGUSTUS (1846-), rear admiral (retired) of the United States navy, born at Batsto, N. J. In 1861 he was appointed acting midshipman in the navy and saw service for a time during the Civil War, graduating from the United States Naval Academy in 1866, he was present two years later at the opening to trade of the ports of Kobe and Osaka in Japan and commanded the marines which protected Yokohama until order was restored. He was promoted through the various ranks up to that of rear admiral in 1907. He commanded the *Niagara* during the Spanish-American War, the *Monocacy* at Shanghai, China, in 1899, was commandant of the Naval Station at Key West, Fla. (1902-04), and for two years was in command of the battleship *Owens*, flagship of the United States Coast Guard. After serving as commandant at the Annapolis and Portsmouth navy yards from 1906 to 1908, he was in the latter year retired on active service.

BICOL, bá-kól' See **VICOL**.

BICORNED, LORD. A term applied to Alexander the Great, suggested by the two horns with which, on certain ancient coins, his head is decorated.

BICYCLE, bí-sí-k'l (Lat *bis*, twice + *Gr. κύκλος, kýklos*, circle, wheel). A name given to the special form of man-motor machine which

than the other, hence arose the familiar name, "the wheel," which is also applied, though less appropriately, to the machine of to-day, which was first known as a "safety bicycle," in which the two wheels are of the same diameter. Within 10 years the bicycle leaped into public favor by enormous bounds, and for a while its use became well-nigh universal in the United States,

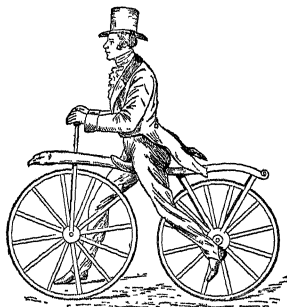


VELOCIPÈDE, 1867

and as a natural consequence its manufacture developed into a vast industry.

The so-called "bicycle craze" was at its crest in 1899, when the value of the American product, which amounted to about 1,000,000 wheels per annum, was estimated at more than \$31,000,000. By 1904 the interest in cycling had declined so that the annual production had fallen in value to some \$5,000,000, and from this time the industry, as well as the use of the bicycle, has remained more or less stationary, with many of the bicycles manufactured in the United States being sold for export. The increased use of the motor car and the motorcycle has attracted many of those who formerly were devotees of bicycling as a means of recreation, and the use of the wheel as a matter of convenience by those living at a distance from their place of occupation while it has continued is being largely supplanted by the motorcycle. In Europe, especially England, the use of the bicycle persisted longer than in the United States, and it still has its devotees, though not to the extent that it once enjoyed.

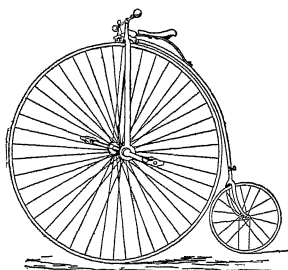
The history of cycling, as a popular pastime at least, might justifiably be assumed to begin with the advent of the English high-wheel bicycle in 1873, but, in order to trace the evolution of the machine from its conception, we have to go back to a period more than half a century earlier. About the year 1816 Baron von Drais devised a vehicle to assist him in the performance of his daily duties as chief forester to the Grand Duke of Baden. This machine, which was named "draisine," after the inventor, and was exhibited and patented in France shortly afterward, is claimed to have been a rudimentary bicycle. It was composed of two tandem wheels of equal size, connected by a perch, on which the rider partly sat, propelling it by thrusting with his feet upon the ground, and guiding it by a bar connected with the front wheel, and provided with a rest for the arms. In 1891 a handsome monument was erected in memory of the "Father of the Bicycle," over his grave at Karlsruhe, the expenses of which were borne exclusively by bicyclists. An improved form of draisine appeared in England in 1818, and was patented by



DRAISINE, OR CHERLEPERÈDE, 1816

was introduced into England about 1873 and the United States in 1877 and was the immediate forerunner of the modern bicycle. This early and now obsolete bicycle was a skeleton vehicle consisting primarily of two tandem wheels, the forward one and "driver" being very much larger

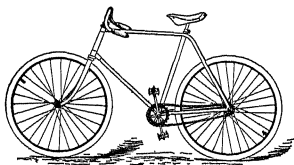
Denis Johnson, under the name of "Johnson's Pedestrian Curricule." This machine was very popular for a short time, but as soon as it acquired the suggestive titles of "hobby horse" and "dandy horse," it rapidly fell into disuse



ORDINARY OR HIGH WHEEL, 1874

In June, 1810, the curricule was patented in the United States by Wm K Clarkson, but failed to arouse more than a languid interest. The next progressive step in the improvement of this novel vehicle was made by Louis Gompertz in England in 1821. The rider was still obliged to thrust with his legs as before, but there was placed in front of the body rest a lever connected with a segment rack, gearing in a pinion on the front wheel, which could thus be driven by the hands. This machine, however, did little to retard the waning popularity of the "hobby horse," and the contrivance was practically allowed to sink into oblivion for nearly a quarter of a century. About 1840 a Scotchman named Kirkpatrick McMillan applied driving levers to a machine of the draisine type, and four or five years later another Scotchman, one Gavin Dalzell, actually produced a rear-driving "safety," on which he was able to travel 10 or 12 miles an hour.

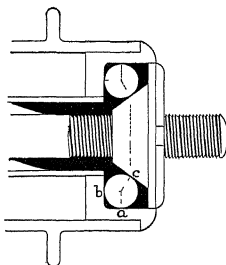
During the next 10 years we hear more or less of the French velocipede, and finally, in 1855, one M Michaux, a carriage repairer in Paris, brought out a machine not unlike the draisine, but having cranks and pedals fitted to the front wheels. A monument was erected to



TYPICAL CHAIN WHEEL

Michaux in France in 1894. Another inventor, Pierre Lallement, said to have been in the employ of M Michaux, shares with the latter the credit of having laid the foundation stone of modern cycling. At all events Lallement secured, in 1865, a patent on a two-wheeled

velocipede, propelled directly by cranks and loose pedals and surmounted by a wooden perch. The inventor then came to the United States, where he patented a second velocipede Nov 20, 1866. Lallement's machine, which was dubbed "boneshaker" in England, was vastly improved in France shortly afterward and is said to have made cycling a fashionable pastime in Paris during the winters of 1866 and 1867. Schools were established for teaching the art of riding, and everybody who claimed to be anybody possessed a velocipede. So universal was the practice, in fact, that at the Grand Opera House straps were fixed to the walls of the vestibule for holding the machines of fashionable velocipedists. These vehicles were handsomely finished and cost from 625 to 750 francs each. Meanwhile cycling interest was revived in England. In 1866 Edward Gilman patented a velocipede which was to be propelled by a treadle, connected with cranks on the axle of the rear wheel. An endless chain and a "two-speed gear" had already been suggested the same year. The cycling mania soon spread to the United States, and by 1869 manufacturers had all they could do to supply the demand for velocipedes. Inventive ingenuity continued to make surprising progress in Eng-

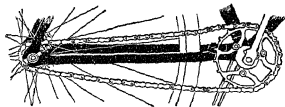


BALL BEARING

land until, in 1873, James Starley, of Coventry, the second "Father of the Bicycle," produced the first machine embodying most of the features which were found in the ordinary or high wheel. The driver was about three times the size of the rear wheel, and both were provided with rubber tires and cross-tension spokes. Succeeding changes increased the size of the front wheel until it was 60 inches in diameter, depending in large part on the height of the rider, and that of the rear wheel was correspondingly reduced until it fell to 16 inches. In 1875 the average roadster weighed 65 pounds. The modifications and improvements of the 10 years, during which the bicycle enjoyed a halcyon career on both sides of the Atlantic, included plan, roller, and adjustable ball bearings, direct and tangent spokes, and cushion tires. Most important of these improvements was the ball bearing, which soon was applied to all the moving parts of the wheel, with the result that its propulsion was accomplished with far less effort and the rider was able to make greater speed and ride longer distances. The ball bearing illustrated in section consists of a series of steel balls, arranged in a circle, on which the axle moves, its bearing surface being a cone so turned that it is tangent

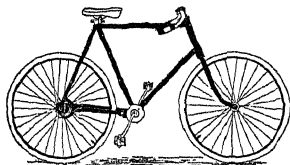
to the steel ball at *c*. The balls in turn bear against two other tangent surfaces at *a* and *b*. Consequently friction is reduced to a minimum, as the points of contact are theoretically a number of points instead of surfaces.

Meanwhile the idea of a low or safety machine was slowly but surely beginning to assume a tangible shape. An Englishman named H. T. Lawson invented a rear-driving safety in 1876. This machine was followed by the Bicycleette in



CHAIN AND SPROCKET

1880, the Kangaroo in 1883, and finally by the Muvet and the original Rover in 1884. The last mentioned, brought out by the veteran James Starley, was really the prototype of the modern bicycle. For a long time the word "Rover" was applied to all safeties of the new pattern—those with wheels of nearly equal size, the front wheel steering, and the rear one driving by means of a single chain. But the name gradually lost its meaning as the designation of a type, and was replaced by the more comprehensive term "Safety," for since 1890 the high wheel is scarcely to be found outside of junk or curiosity shops. Previous to 1875 English bicycles were imported to supply the demand in the United States, but in that year the Pope Manufacturing Company started the manufacture of bicycles in Boston. The safety model was universally adopted by manufacturers in this country in 1888. A year later the most important of all modern improvements on the bicycle was made by the application of the pneumatic tire. This was not originally designed for the bicycle, but was patented by R. W. Thompson in England in 1843 and in the United States in 1847. Its application to the bicycle was patented in 1889 by Dunlop. After the adoption of the pneumatic tire the development of the bicycle consisted in improving its various parts to secure greater strength and lightness and more grace-



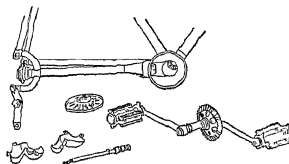
CHAINLESS TYPE OF 1898 (BEVEL GEAR)

ful form, in the invention and improvement of special parts, such as the coaster brake, saddles, adjustable handle bars, and other familiar fittings, the application of bevel gears and a driving shaft in place of the sprocket wheel and chain, the invention of the drop frame for ladies' bicycles, and the development of the machine for two, four, six, and even eight persons. Some notion of the number of inventions developed in

connection with the bicycle is conveyed by the fact that over 5000 patents have been granted on velocipedes and bicycles.

In the Census of Manufacturers for 1899 these were reported 312 establishments with an aggregate capital of \$29,783,650, and a production for the year of 1,112,880 bicycles valued at \$22,127,310. By 1900, as recorded in the bulletin published in 1912, these figures had shrunk to 95 establishments with a capital of \$9,780,102, whose output for the year was 168,824 machines valued at \$2,436,996.

A description of the modern bicycle is somewhat superfluous, so familiar has the construction of the machine become during the last decade. Generally speaking, a modern bicycle weighs from 23 to 27½ pounds complete. The frame consists of cold-drawn, hollow steel tubing, with all joints brazed, and all bearings of the ball type. Suspension wheels with steel wire spokes, wooden rims, and pneumatic tires are universally employed. Popular favor approves the sprocket wheel and chain driver, but a large number of machines are built with shaft and bevel-gear drive. A so-called coaster brake enabling the speed of the wheel to be checked by pressure on the pedals is also a feature of modern machines. Consult H. A. Garratt, *The Modern Safety Bicycle* (New York, 1899), which



MECHANISM OF BEVEL GEAR CHAINLESS BICYCLE

contains a careful discussion of bicycle design and construction, Allen, *Wheel Magic* (London, 1906); Henry, *Cycle Building and Repairing* (New York, 1913). See CYCLING, MOTOR-CYCLE.

BIDA, bē'dā. A town of Nigeria, Africa, capital of the state of Nupe, situated a short distance north of the Niger (Map Africa, F. 4). An extensive trade is carried on, and the industries include embossed copper and brass works, a glass factory, and the dye works. It is well fortified, and its population is estimated at from 50,000 to 90,000.

BIDA, bē'dā', ALEXANDRE (1813-95). A French painter and illustrator. He studied with Delacroix at Paris and excelled in water colors. His favorite subjects were taken from the Orient, especially Palestine, which he visited repeatedly. His best works were produced in 1867-67, such as "Return from Mecca," "Refectory of Greek Monks," "Jews Praying at the Wall of Solomon," "The Field of Boaz at Bethlehem," "The Mosaic of the Mamelukes" (Metropolitan Museum, New York). He is best known, however, for his illustrations for Alfred de Musset's complete works in 10 vols. (1865-66); and for the Bible, comprising the Book of Ruth and the Four Evangelists (1876).

BIDASSOA, bē'dās-sō'a (Basque, ptic river) A river which forms part of the boundary between Spain and France and falls into the Bay

of Biscay at Fuenterrabia. On the Isle of Pheasants (called also *Ile de Conférence*) in its mouth the momentous Treaty of the Pyrenees was concluded in 1659. Bidassoa was the scene of several conflicts during the Napoleonic wars. In 1793 the Spanish broke into France, across the Bidassoa, but were driven back with loss in 1794, and their entrenched camps taken Aug. 1, 1813, the French under Soult were defeated at San Marcial, on the Bidassoa, by the Allies, and in October of the same year Wellington surprised and drove the French from their strongly fortified position on its northern side.

BIDDEFORD A city in York Co., Me., 15 miles southwest of Portland, on the Saco River, and on the Boston and Maine Railroad (Map Maine, B 5). The river furnishes excellent water power, and the city has extensive manufactures of cotton goods, machinery, match blocks, shoes, wooden boxes, and lumber. It also ships a superior quality of granite. On account of its fine beach and good boating and fishing facilities, the city has some reputation as a summer resort. It has a hospital and a public library. Biddeford was settled in 1630, was part of Saco until incorporated as a separate town under its present name in 1718, and was chartered as a city in 1855, the charter of that date now being in force. It provides for an annually elected mayor and a bicameral council. The mayor appoints a few subordinate officers, but the heads of the several administrative departments are elected by the two houses of the council in joint session. Pop., 1900, 16,145; 1910, 17,079. Consult Folsom, *History of Saco and Biddeford* (Saco, 1830), and Clayton, *History of York County* (Philadelphia, 1880).

BIDD'ING PRAYER ('a prayer which bids or directs what is to be prayed for'). A form of exhortation, always concluding with the Lord's Prayer, enjoined by the fifty-fifth canon of the Anglican church, in 1603, to be used before all sermons and homilies. It is a prayer for the church, the sovereign, various classes of people, and a thanksgiving for the faithful departed. Except in cathedrals and the university churches, it is now seldom used, though the use has grown somewhat of late. The form is of extreme antiquity, and we have a similar one in the apostolic constitutions (q.v.), probably that used in the Church of Antioch. It was anciently used for the communicants or believers after the dismissal of the catechumens and was pronounced by the deacon, each petition beginning with the words, "Let us pray for —," and the people responding at the end of each with "Kyrie Eleison," or some such words. There is another very ancient example in the Ambrosian liturgy, and St. Chrysostom alludes to such a form in one of his sermons. It must have been, and even now in its abridged shape still is, very impressive, allowing each individual to supply from his own thoughts special cases of necessity under the different heads. There is close resemblance between the bidding prayers and the Prayer for the Church Militant, used in the Anglican church in the communion service. Consult Wheatley, *Bidding of Prayers Before Sermon No Mark of Disaffection to the Present Government Or an Historical Vindication of the LVth Canon* [of the English Prayer Book] (London, 1718, new ed., 1845); Dearmer, *Buryman's History of the Prayer Book* (Milwaukee, 1913); Harford, *Prayer Book Dictionary* (New York, 1912).

BIDDLE, CLEMENT (1740–1814) An Amer-

ican soldier of the Revolution, born in Philadelphia and known as the "Quaker Soldier." He raised a corps for the protection of friendly Indians against the outlaws known as "Paxton Boys." In the beginning of the Revolution he was an officer in the Quaker Volunteers and was made deputy quartermaster general. After the battle of Trenton he was delegated by Washington to receive the swords of the Hessian officers. He was also at Princeton, Brandywine, and Germantown, and rendered valuable service in the terrible winter of 1777–78 at Valley Forge. He left the military service in 1780 and was appointed by Washington United States Marshal of Pennsylvania in 1787. As quartermaster general of the State, he accompanied, in 1794, the expedition sent to suppress the Whisky Insurrection.

BIDDLE, JAMES (1783–1848) An American naval officer. He was born in Philadelphia, entered the navy in 1800, and served as midshipman in the war with Tripoli, where he was made prisoner and kept until the peace. He was lieutenant on the *Wasp*, which captured the British *Fyoko* early in the War of 1812, and was put in command of the prize, but both vessels were captured by the *Poachers* and taken to Bermuda. Exchanged in 1813, he served on the *Hornet*, in command of which he sailed for the East Indies, captured the *Penguin*, and was wounded in action. Congress gave him a gold medal and the rank of captain. In 1817 he was sent to take possession of Oregon for the United States, in 1845 he negotiated the first treaty between the United States and China and during the Mexican War served on the Pacific coast.

BIDDLE, JOHN (1815–62) The founder of English Unitarianism. He was born at Wotton-under-Edge, in Gloucestershire, baptized Jan. 14, 1815, and in 1831 entered Magdalen, Oxford, where he took his degree of B.A., 1838, and M.A., 1841. In 1841 he was elected master of the free school in the town of Gloucester, the duties of which office he discharged with such zeal that the character of the institution was greatly improved, but having embraced certain opinions—which he put in writing for private circulation—in regard to the personality of the Holy Spirit, at variance with those held by the majority of Christians, he was thrown into jail, Dec. 2, 1845, but bailed out. Being in January, 1847, summoned before the Parliament at Westminster on account of his heresy, he was imprisoned and then published the manuscript *True Questions or Arguments Drawn Out of Scripture, Wherein the Commonly Received Opinion Touching the Duty of the Holy Spirit is Clearly and Fully Refuted* (London, 1847). He was formally tried and condemned to imprisonment. The famous Westminster assembly of divines undertook to "settle" Biddle's case, but unfortunately their arguments—as is usual in disputation—had only the effect of strengthening his previous convictions. In 1848, while still in prison, he published a *Confession of Faith Concerning the Holy Trinity*, etc., which was followed by another tract containing the opinions of the Church Fathers on the same question. In consequence of this attempt to combat the orthodox doctrine, the Westminster divines called upon the Parliament to pass an act declaring the denial of the Trinity a crime punishable by death. The army, however, strange to say, moved on this occasion less cruel than the Church, for it manifested such strong opposition

hat the act remained a dead letter. He was again bailed out and preached in Staffordshire, again cast into prison at Newgate, London, and on Feb. 10, 1662, by order of Oliver Cromwell, Parliament passed a general act of oblivion, and so Biddle was released.

He now began to gather a congregation of those whom he had converted to his opinions, namely, that there was but one person, as there was but one nature, in the Godhead. The members were first called Bidellians, then Socinians, and finally assumed for themselves the name of Unitarians. In December, 1654, he was again imprisoned, for faith's sake, released on May 28, 1655, only again to be imprisoned after a month, and Cromwell was, on Oct. 5, 1655, in order to save his life, compelled to banish him to one of the Scilly Isles. Three years of imprisonment having elapsed, he was permitted to return and continued to preach in London till the death of Cromwell (Sept. 3, 1658), and also after the restoration, until June, 1662, when he was again apprehended and fined £100. Being unable to pay, he was committed to jail, where he died Sept. 22, 1662, of the rigors of the imprisonment. His personal character was highly esteemed by those who knew him. For biography, consult Joshua Toulmin (London, 1789, new ed., 1805), Spears, *Memorable Unitarians* (London, 1906).

BIDDLE, NICHOLAS (1750-78) An American naval officer. He was born in Philadelphia, went to sea at the age of 13, and in 1770 entered the English navy as midshipman, but deserted and joined Captain Phipps's Arctic expedition as seaman. On the outbreak of the Revolution he joined the Americans and was made a captain. He captured two British transports with valuable cargoes and a battalion of Highlanders in 1776, and as commander of the *Randolph* took four prizes and received command of a vessel to cruise in the West Indies. He was killed in an engagement with the *Yarmouth* near Charleston, S. C.

BIDDLE, NICHOLAS (1786-1844) An American financier. He was born in Philadelphia and graduated at Princeton in 1801. He was secretary to President Monroe, then United States minister to England, returned from that country in 1807, and settled down to the practice of law. In 1810 he became a member of the Legislature of Pennsylvania. He was appointed a director in 1819, and president in 1823, of the United States Bank and for the most part conducted its affairs with great skill, integrity, and prudence. On the expiration of the old charter in 1830 he became president of the new United States Bank, chartered by the Legislature of Pennsylvania, but resigned in 1839, and the bank became insolvent in 1841. Biddle had considerable literary taste and from 1812 to 1823 edited and contributed to the *Philadelphia Portfolio* a request of the President of the United States, compiled from the original papers a *History of Lewis and Clark's Expedition to the Pacific Ocean*, which, however, bears the name of Paul Allen on the title page, Allen having completed the work after Biddle's election to the Legislature in 1810. Biddle also published *The Commercial Digest*, a volume issued under the authority of Congress.

BIDDLE, WILLIAM PHILLIPS (1853-) Major general of the United States Marine Corps. He was born in Philadelphia, was educated in private schools and at the University

of Pennsylvania, and, becoming captain in the Marine Corps in 1894, was with Admiral George Dewey on the flagship *Olympia* at the battle of Manila Bay. He had charge of the American division of the international forces that took part in the Boxer Rebellion in China in 1900, commanded in Panama in 1904-05 and later in the Philippines, was commandant of marine barracks at New York, and (1909-10) was again at Panama. He received a number of medals and was promoted through the grades to major general in 1911.

BIDEFORD, bid'e-fēid (from 'by the ford'). A market and seaport town of Devonshire, England, on the Torridge, about 3 miles above its confluence with the estuary of the Taw, 30 miles northwest of Exeter (Map, England, B 5). A bridge of 24 arches and 677 feet long, built in the fourteenth century, unites the two divisions of Bideford. "The little white town of Bideford," as it has been called by Charles Kingsley, dates from before the Norman conquest. It was in the seventeenth century a serious rival of London and Exeter as a centre of trade. It has manufactures of ropes, sails, earthenware, and leather, and in addition to its own manufactures exports timber and coal mainly to Ireland and Wales. Pop., 1891, 7800, 1901, 8800, 1911, 9078. Vessels of 500 tons can approach the quay in the centre of the town. Bideford was the birthplace of Sir R. Grenville, one of the founders of Virginia, whose exploit in attacking a Spanish fleet with his single ship, the *Revenge*, has been celebrated by Tennyson. Consult Watkins, *History of Bideford* (Exeter, 1792).

BIDPAI, bid'pī, or **PILPAI**. The reputed author of a collection of fables which have become famous all over Europe and Asia under his name. The earliest version of this collection which we now possess is the Arabic. (See below.) But this was not the original form of the fables. The researches of Colebrooke, Wilson, De Sacy, Loiseleur Deslongchamps, and Benfey have shown the origin of the tales, their growth, and subsequent modifications. The ultimate source was the unwritten collection of Sanskrit fables, which has, unfortunately, not come down to us. From this Sanskrit it was made the oldest recension which we possess, the *Pañcatantra* (qv). An abridgment of this work was later made in Sanskrit, called the *Hitopadeśa* (qv). This work has always been very popular throughout India. It was the first Sanskrit book ever printed in the Devanāgarī script (ed. Carey, Serampore, 1803). Two translations into English had previously appeared—one by Wilkins (Bath, 1787), and the other by Sir W. Jones (London, 1799).

In early times the fame of the Sanskrit original from which both the *Pañcatantra* and the *Hitopadeśa* are descended reached Persia, and so interested the reigning King, Khosrū Anushirvān (531-579 A.D.), known as "The Just," that he sent his court physician, Barzoi, to India to learn more about the matter. Barzoi translated the collection into Pahlavi, the literary language of Persia at that time, with the title of *Kahāleh and Dimnah*, from the two jackals, Karataka and Damanaka, who appear prominently in the Sanskrit. From the Pahlavi two important translations were made. The first was the old Syriac (c. 570) of Bod, and the Arabic of Abdallah-ibn-al-Mokaffa, who lived in the reign of the Caliph Almansur (754-775). In the intro-

duction to this Arabic translation, the author of the original is called Bidpai, the chief of Indian philosophers. Bidpai is the Sanskrit word *vidyapati* ('master of knowledge'), so it was probably used as a title of honor rather than as a proper name. Great interest centres in the translation of Mokaffa, for its influence upon literature has been very great. There are three elements which can be distinctly traced in its chapters—the Persian in 3 chapters, the Arabic in 6, and the Indian in 12. Of these 12 3 may be traced to the *Mahābhārata*, 5 to the *Paicatantra*, 2 to the first book of the *Paicatantra*, and of 2 the originals seem to be irrecoverably lost. Buddhism was the inspiration for most of the stories, and comparisons with the *Jatakas* or 'Birth Stories' of the Buddha reveal the origin of nearly, if not quite all, of the parables. These *Jatakas* have been widely scattered in the course of Buddhist propaganda, and they can be found in more or less changed forms in Greek, Persian, Arabic, Syriac, Chinese, Japanese, Korean, Mongolian, Finnish, and Samoyed literature, as well as throughout Europe. In the fables of Bidpai, animals appear and act as if endowed with human powers. The stories themselves are usually rather simple, but are interspersed with maxims and sayings of shrewd practical wisdom.

On the Arabic version of Mokaffa five different translations were based, which, in turn, were the bases of many others. These five were the later Syriac (tenth or eleventh century), Greek, by Symeon Seth (c 1080), Hebrew (thirteenth century), Persian of Nasrullah (c 1120), and Old Spanish (1251), from the text of which Raimund made his Latin version (1313). A more important Hebrew translation was that of Rabbi Joel, from which was made the Latin *Doctrinum Humanae Vitae* (c 1270) of John of Capua, who was a converted Jew. This is the most important translation of the fables, for from it flowed most of the translations into the modern European tongues. Some of these were German of Graf Eberhard (c 1480), from which came the Danish (1618) and Dutch (1623), the Spanish *Exemplario* (1493), on which was based the first Italian version, Frienzuola's *Discorsi degli animali* (1548), and another Italian translation by Domi, the *Moral Philosophy* (1552), from which was made the English version of North (1570). From the Persian translation of Nasrullah was made the later Persian collection, the *Anwar-i-Suhaili* (end of fifteenth century), which was the parent of the Turkish *Humayun-namah* (sixteenth century), and the versions in the vernaculars of India. Through the Turkish came the Spanish, and the French of Galland (1724-78), the basis of the Greek (1783), Hungarian (1783), and Dutch translations.

The text of the Arabic collection was edited by De Sacy (Paris, 1816). It was translated into German by Wolff (2 vols., 2d ed., Stuttgart, 1830), and into English by Knatchbull (Oxford, 1819). For the literary history of the fables, consult J. G. N. Keith-Falconer, *Translation of Wright's Edition of the Later Syriac Version of Bidpai's Fables*, with an admirable introduction (Cambridge, 1885). For the fables Rhys Davids, *Buddhist Birth Stories* (London, 1880), Max Müller, "On the Migration of Fables," *Chips from a German Workshop*, vol. III (London, 1880), North, *Moral Philosophie of Dens*, ed. Jacobs (London, 1888), Deslongchamps, *Essai sur les fables indiennes* (Paris, 1838), The

Anwar-i-Suhaili, or Lights of Canopus, trans. by A. N. Wollaston (new ed., London, 1904), E. G. Browne, *Persian Literature* (1906). For John of Capua, consult Hervieux, *Les fabulistes latins* (1899).

BIDWELL, MARSHAL SPRING (1798-1872). A Canadian legislator and political reformer, born in Massachusetts. In 1811 he went to Upper Canada with his parents and settled at Bath. He was called to the bar, entered political life, and soon became prominent among the reformers who were contending for responsible government (see **POLITICAL PARTIES, CANADA**). He was elected several times to the Legislative Assembly, and was twice elected Speaker of that body. Previous to and during part of the upper Canadian rebellion of 1837-38 he was a leader on the popular side, and the object of much suspicion and hostility in Tory circles at Toronto. In 1837 the Secretary of the Colonies in London favored his elevation to the bench and instructed the Lieutenant Governor, Sir Francis Bond Head (qv), to act accordingly, but Head refused, owing to Bidwell's alleged communications with the rebels. It is recorded that Bidwell was compelled to choose between permitting the Lieutenant Governor to examine certain letters that had been put into his possession by the postmaster, and the alternative of leaving the province. He left for New York City in 1838, and there became eminent as a lawyer and public-spirited citizen.

BIEBERSTEIN, be'ber-shitn, ADOLF MAR-SCHALL, BARON VON (1842-1912). A German diplomat and statesman, born in Karlsruhe, in the Grand Duchy of Baden. He was educated in the Frankfurt Gymnasium and at the University of Heidelberg. At an early age he entered the diplomatic service, but did not rise to importance until, upon the retirement of Bismarck in 1890, he was made Secretary of State for Foreign Affairs, with special charge of the details of commercial treaties. During this period, and after 1894, when he was Prussian Minister of State, he gained such a reputation for skill and diplomacy that in 1897 he was appointed Ambassador to Turkey. During his residence of more than 13 years in Constantinople he was frequently called to Berlin for important conferences with the German Emperor, and it was generally understood that he would have succeeded Count von Bulow as Imperial Chancellor but for the fact that a man of Von Bieberstein's calibre was needed in Constantinople to maintain Germany's domination in Turkey and prevent England's return to power there. Most of what he accomplished, to be sure, was undone by the revolution of the Young Turks, the Russo-Italian War, and the Bulgarian War of 1912. Von Bieberstein is said to have inspired the Emperor's telegram of sympathy to President Kruger of the Transvaal at the outbreak of the Boer War, and because his position at The Hague Peace Conference was often in marked opposition to that of the British delegates, it was inferred that he was, to all intents and purposes, the Emperor's proxy. In June, 1912, he was made German Ambassador to Great Britain, at a time when his reputation was greater than that of any other German diplomat. His transfer was heralded as proof of a German decision to change its foreign policy toward both England and Turkey. He died, however, before there was any opportunity of ascertaining the truth of this belief. See **GERMANY, History**.

BIEBRICH, be'brīk. A town in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, about 3 miles south of Wiesbaden. Its most noteworthy building is the summer palace of the dukes of Nassau, which dates from the seventeenth century. The industrial establishments of Biebrich include iron foundries, and manufactures of cement, soap, asphalt, varnish, and various acids. It is the river port of Wiesbaden, and an important station for both passenger and freight traffic. Pop., 1905, 18,980, 1910, 21,104.

BIEDERMANN, be'der-man, FRIEDRICH KARL (1812-1901). A German publicist and historian, born in Leipzig. He studied at the universities of Leipzig and Heidelberg and was appointed professor of philosophy at Leipzig in 1838. He was a prominent member of the Frankfurt *Vorparlament* of 1848, and was elected to the National Assembly, of which he was for a time First Vice President. In 1854, as editor of the *Deutsche Annalen*, he was sentenced to one month's imprisonment and was removed from his professorship. He was restored to this position in 1855. From 1863 to 1879 he edited the *Deutsche Allgemeine Zeitung* and in 1871-74 was a member of the Reichstag. His many publications include *Die deutsche Philosophie von Kant bis auf unsere Tage* (2 vols., 1842-43), *Erinnerungen aus der Paulskirche* (1849), *Friedrich der Grosse und sein Verhältnis zur Entwicklung des deutschen Geisteslebens* (1859), *Fünfzig Jahre in Dienste des nationalen Gedankens* (1892), *Vorlesungen über Sozialismus und Sozialpolitik* (1900), *Deutsches Volk und Kulturgeschichte* (4th ed., 1901). Consult his *Mein Leben und ein Stück Zeitgeschichte 1812-1886* (2 vols., 1886).

BIEDERMANN, GUSTAV WOLDEMAR, BARON VON (1817-1903). A German literary historian, and Saxony railroad official, born at Marienberg. He made numerous valuable contributions to Goethe literature, among which are editions of the letters of Goethe to Friedrich Schlegel (Berlin, 1872) and to Rochlitz (Leipzig, 1887), *Goethe und Leipzig* (2 vols., 1895), *Goethe und Dresden* (1875), *Goethe Forschungen* (1879, 1886, 1899), *Goethes Gespräche* (10 vols., 1889-97).

BIEÛVE, byé', EDOUARD DE (1809-82). A Belgian historical and portrait painter. He was born at Brussels, and was a pupil of Pacheco in the Brussels Academy, and of the sculptor David d'Angers in Paris. His most famous work is the "Compromise of the Brussels Nobles of Feb. 10, 1566," produced by order of the government and now in the Brussels Museum, which was greatly praised at the Paris Exhibition of 1855. It was also exhibited throughout Europe and made, especially in Germany, a deep impression by reason of its coloristic treatment. Some of his other works are "The Last Moments of Anne Boleyn," "The Introduction of Rubens to Charles I of England," "Masaniello," "Ugolino," "Raphael and La Fornarina," and "The Knights of the Teutonic Order Recognizing the Elector of Brandenburg as their Grand Commander," painted for the King of Prussia. Bieûve was one of the principal representatives of the Romantic school in Belgium.

BIEL, GAMBIEL (c1425-95). A German scholastic philosopher. He was born at Speyer, studied at the universities of Heidelberg and Erfurt, became preacher of the cathedral of St. Martin, Mainz, and subsequently provost of Urach, Wittenberg. In 1494 he was appointed professor of theology and philosophy in the newly

founded University of Tübingen. He was among the last representatives of the Nominalism (qv) of Occam (qv). His works include *Epitome et Collectorium ex Occamo super IV Libros Sententiarum* (1495), *Expositio Canonis Missæ* (1510), *Sermones Dominicales de Tempore et de Sanctis per Totum Annum* (1519), *De Moneturum Potestate simul et Utilitate* (1541).

BIELA, be'la, WILHELM VON (1782-1853). A German astronomer. He was born at Rossia, Prussia, became a captain in the Austrian army, and died in Venice. He is celebrated as the discoverer of a comet named after him. See **BIELA'S COMET**.

BIELAGA. See **STURGEON**.

BIELA'S COMET. One of the comets of short period, named from its discoverer, Wilhelm von Biela (qv). Its periodic time is 6,602 years. Observations are on record for the appearances that took place in 1772, 1805, 1826, 1832, 1846, and 1852. On its return in 1846 it was in two parts, separated by about 160,000 miles, unequal in size, each having a distinct nucleus and tail. At the return in 1852 the parts were 1,500,000 miles asunder. Since then it has not been seen. It has been suggested with much probability that it has been broken up and dispersed, forming material for shooting stars.

BIELAU, be'low. See **LANGENBIELAU**.

BIELAYA, byél'a-ya (Russ. *byelaya*, white, i.e., *ryeka*, river). A river in the governments of Ufa and Orenburg, Russia, emptying into the Kama after a course of about 500 miles (Map Russia, J 4). From its source among the marshes on the Ural ridge in lat. 53° N, it flows northwesterly through a mountainous mining region until it reaches the city of Ufa, where it is spanned by a railway bridge. The Bielaya is navigable from this city to its junction with the Kama, 200 miles below. Regular passenger and freight transportation of timber, mineral products, and salt is carried on during the navigable season, April to November. Nine other Russian rivers bear the name, the most important of which are the river in the government of Ekaterinobsk, 150 miles long, with coal deposits on its banks, and the affluent of the Angara in the government of Irkutsk, Siberia.

BIELAYA TSERKOV, byél'a-ya tser'kóf (Russ. white church). A town in the government of Kiev, Russia, the revenues of which go to the Counts Brantky. It is situated in an affluent of the Dnieper, 30 miles southwest of Vasilkov (Map Russia, D 5). It carries on an important trade in grain and cattle and has machine works. Pop., 20,700.

BIELEFELD, be'le-félt (MITG. *bil*, simple, plain, level + *Gei*, field, field, cf. Eng. *Plain-field*). A town of Westphalia, in Prussia, on the Lutter near the Teutoburg forest, Brunschwick-flamm, 385 feet above sea level (Map Prussia, C 3). Near the town, on a hill, is the old castle of Spandenburg, built in the twelfth century by Count Bernard of Lippe. Previous to its destruction by fire in 1877 it was used as a prison, but now in its restored state is fitted up as an historical museum. The city affairs are administered by a municipal council of 36 members who elect a burgomaster and an executive board of eight. The town has a gymnasium, two hospitals, and clinics. It is one of the principal industrial towns of the province and is the centre of the linen trade, the productions of the Ravensberg, Westphalian and the Vorwärts factories together.

amounting yearly to about 9,000,000 marks. There are also manufactures of silk and plush materials, furniture, glass, sewing machines, motor cars, and bicycles. Pop, 1900, 63,044, 1910, 78,334.

BIELGOROD, byél'gó-rót. See BELGOROD.

BIELINSKY, byél'-lyén'ské, VISSARION. See BELINSKY.

BIELITZ, be'lits (Polish *Bielsko*, from the river *Biala*, white). A town of the Austrian crownland of Silesia, on the left bank of the river *Biala*, about 40 miles west southwest of Cracow (Map Austria, F 2). A bridge over the river connects it with the town of *Biala*, in Galicia, and it contains the old castle of Prince Sulkowicz. It is one of the chief seats of the Austrian woolen industry and exports large quantities of cloth, particularly to the Orient. There are also manufactures of machinery, wire nails, furniture, glassware, and paper. Pop, 1890, 15,000. 1900, 16,900. 1910, 18,568, mostly Germans. Bielitz was founded in the thirteenth century and was made a principality in 1752.

BIELLA, byél'la. A city in the province of Novara, north Italy, on the Cervo and the Auna, 55 miles northeast of Turin, on the south edge of the lower Alps (Map Italy, C 2). It is divided into two parts: the old town, elevation 1558 feet, lies on a hill above the new town. There are fine old palaces and cathedrals, a gymnasium, seminary, and technical schools. Biella contains manufactures of woollens, silks, and cotton, the power for which is furnished by neighboring falls. The principal trade is in silk, chestnuts, and wine. Pop, 1881, 15,000, 1901, 19,514, 1911, 22,519.

BIELO-OZERO, byél'ó ó'zá-ró (Slav, Russ *byely*, white, *ozero*, lake. Once called *Ves*). A lake in the northeastern part of the government of Novgorod, Russia (Map Russia, E 2). It is elliptical in shape, 27 miles long, 20 miles wide, and occupies an area of over 430 square miles. Its bottom is composed of white clay, which during stormy weather gives to the water a milky appearance. Bielo Ozero is deep, and fish exist in abundance. It receives the Kovsha and Kelma and is drained by the Sheksna, a tributary of the Volga. It is connected by canals with Lake Onega and the Dvina and forms a part of the extensive canal system which connects the Baltic with the Caspian Sea through the Volga.

BIELOPOL, byél'pól (Russ *byely*, white + *Gk pólis*, polis, city). A town of Russia, in the government of Kharkov, 106 miles from the city of that name, on an affluent of the Seim (Map Russia, D 4). It has a considerable trade in grain and cattle and maintains distilleries and brickyards. Pop, 1897, 15,200.

BIELOSTOK. See BIALYSTOK.

BIEŁOWSKI, byél'ów'ské, AUGUSTUS (1806-76). A Polish poet and historian. He was born in Galicia, received a university education, and in 1869 became director of the Ossolinski Institute at Lemberg. His chief work was the publication of the *Monumenta Poloniae Veterissima* (2 vols, 1864, 1872), containing all the chronicles relating to Poland up to the time of Dugosz. This work was continued after his death by the Academy of Sciences at Cracow. Of his other works, mention should be made of his poem, "Lied von Heinrich dem Frommen," and translations from Schiller, his *Kritische Einleitung zur Geschichte Polens* (1850), containing many hypotheses which were afterward

proved untenable by Lelewel and Szańnocha, and his *Pompeii Trogi Fragmenta* (1853), fragments of Pompeius found at the Ossolinski Library and not previously edited.

BIELSKI, byél'ské, MARCIN (c 1495-1575). A Polish historian. He was born at Biala, near Sieradz, Poland. His chief works were his *Kronika świata* (1550-64), a universal history from the earliest period down to his own time, and his *Kronika polska* (1856), a history of Poland, afterward brought down by Bielski's son, Joachim, to the year 1597. They were the first important historical works published in the Polish language, as well as one of the first models of Polish literary prose. On account of alleged heterodox statements, however, these works were interdicted by the Bishop of Cracow in 1617. Besides these historical works Bielski wrote also a number of political satires, which made him many enemies. As a writer he idealized the distant past and naturally regarded his own age as an age of decadence.

BIENAIME, byá'ná-má', LUTER (1795-1878). An Italian sculptor. He was born in Carrara and studied there and at Rome under Thorvaldsen, after whose death he became one of the leading Roman sculptors. His best-known works include "John the Baptist" (1820, Metropolitan Museum), "Cupid and the Dove" (Conte Sommariva, Milan), "Venus" (Turin Museum), and several statues in the Winter Palace, St Petersburg. They are all in the style of Thorvaldsen, of whom he was a mannered follower.

BIENER, be'nér, CHRISTIAN GOTTLÖB (1748-1828). A German jurist of great learning and distinction. He was born at Zorbig, pursued his legal studies at Wittenberg and Leipzig, and became professor of law in Leipzig in 1790. His *Commentarii de Origine et Progressu Legum Jurumque Germaniae* (2 vols, 1787-95) is one of the first notable works on jurisprudence published in Germany. Important, also, are the works entitled, respectively, *Systema Processus Judicialis et Communis et Sacrorum* (1796, 4th ed by Siebald and Krug, 1834-35), *Questiones*, and *Interpretationes et Responsa* (1830).

BIENEWITZ, be'ne-vits, PETER. See ARXANUS, PETRUS.

BIEN-HOA, byén'hó' A town of Lower Cochinchina, French Indo-China, on the Donnia River, 20 miles northeast of Saigon, with which it is connected by canal and telegraph. It is the capital of an arrondissement and is fortified. Pop, 1901, 19,300.

BIENNE, byén (Ger name, *Biel*). A town of Switzerland, in the canton of Bern, 17 miles northwest of the city of Bern, at the foot of the Jura, 1400 feet above sea level, in the valley of the Suze, and at the northern extremity of the lake of Biemme (Map Switzerland, B 1). Surrounded by old walls, Biemme has several interesting buildings, notably the city church and the new Catholic church, the former castle, now the townhall, and the Schwab Museum, which contains an interesting collection of Roman and Celtic weapons, and remains of the ancient lake dwellers. Chief among the educational institutions is the West Swiss Technical Institute, which includes a school for railroad employees and a watchmakers' school. The industries consist mainly of watch making, cotton spinning, tanning, dyeing, bookbinding, machine building, and the manufacture of jewelry, cigars, and paper. It is on the line of railroads running to Basel and Bern. Biemme is a place of great

antiquity, having belonged to the Bishop of Basel, and as early as 1352 it entered into an alliance with Bern for the protection of its liberties. The Reformation so weakened the power of the clerical governors of Bienne that in the beginning of the seventeenth century it had become merely nominal. It was essentially a free city until 1707, when France annexed it, and in 1815 it was united to Bern. Pop., 1900, 22,100, 1910, 23,583.

BIENNE, LAKE OF. A Swiss lake extending from the town of Bienne along the foot of the Jura Mountains in a southwest direction, until within 3 miles of Lake Neuchâtel, its length being about 10 miles and its greatest breadth 3 miles. It is situated at an elevation of 1419 feet above the level of the sea, 8 feet lower than Lake Neuchâtel, whose surplus waters it receives at its southern extremity by the Thièle, by which river it again discharges its own. Its greatest depth is 280 feet. Towards its southern extremity is situated the island of St. Pierre, crowned with a grove of fine old oaks, to which Rousseau retired for two months after his proscription at Paris in 1765.

BIENNIALS (Lat. *bis*, twice + *annus*, year). Plants whose life cycle is completed within two vegetation periods, separated by a period of rest. Many biennials are rosette plants during the first season and have erect leafy stems the second season. See **DURATION**, **SIEMIS**.

BIENTEVEO, byán'tá-vá'ó (for derivation see below). A tyrant flycatcher of southern South America (*Pitangus bolianus*) familiar about the houses and gardens of Buenos Aires and neighboring villages. It is noted for its loud, cheerful cry, "in which," says W. H. Hudson, "people fancy there is a resemblance to the Spanish words *bien-te-voo*, 'I see you well,' while its big head and beak and strongly contrasted colors, especially the black and white head stripes, seem to give it a wonderfully knowing look." In exception to the custom of its family it erects a very elaborate domed nest which it sometimes takes weeks to construct. It feeds upon insects and also fishes in pools for small fry and tadpoles and haunts places where raw meat is obtainable. The adult has a black head, with a large yellow crest and white eye stripe, the upper parts are brown and the lower surface sulphur-yellow.

BIENVILLE, byán'vél', JEAN BAPTISTE LE MOYNE, SIEUR DE (1680-1768). One of the four brothers who were conspicuous in the exploration and settlement of the French province of Louisiana. The others were Iberville, Souville, and Chateaugay, all sons of Charles Le Moyne. In 1699 Iberville, accompanied by Bienville and Souville, arrived from France and founded Biloxi and a post on the Mississippi River, some 50 miles from its mouth. In 1701 Bienville succeeded Souville as Governor of Louisiana. He founded Mobile, whither he transferred the seat of government. Chateaugay joined him in 1704 with 17 settlers from Canada, and 20 women arrived from France to be married to the colonists. Bienville was dismissed in 1707, but his successor died at sea and left him still in authority. The colonists suffered exceedingly from the cumbersome system of French Colonial administration, failed to prosper, and made no return to the King for his large outlays. In 1712, therefore, Louis XIV. farmed out the Colony to a rich merchant, Antoine Crozat,

granting him an absolute monopoly in trade and the right to import negroes from Africa. In 1713 Cadillac was made Governor of the province, with Bienville as his deputy. They quarreled, and Cadillac was replaced by Epinay. Crozat soon threw up the Colony as a losing venture. In 1718 Bienville was made Governor, and with the aid of men sent out by Law's Mississippi Company, founded the city of New Orleans, which became the seat of government in 1723. Recalled the next year, he went to France to answer certain charges, leaving in the Colony a code regulating slavery, prohibiting all religions except the Roman Catholic, and banishing Jews. In 1726 he was removed, but was reappointed in 1733, and made lieutenant general throughout the whole of his active career in Louisiana. Bienville was intent upon the welfare of the Colony. That the Colony did not prosper more rapidly must be ascribed to the French Colonial policy rather than to the faults of Bienville. In 1743 he was finally superseded, and he passed the remainder of his life in France.

BIER, bër, AUGUST (1861-) A German surgeon, born at Helsen, Waldeck, Germany. He was educated at the universities of Berlin, Leipzig, and Kiel. In 1889 he became lecturer, and in 1894 professor, at Kiel. In the latter year he was appointed professor and director of the surgical clinic at Giefsfeld, and in 1903 he took up the same work at Bonn and in 1907 at Berlin. He became known as a daring operator and as an originator of new surgical methods. His publications include *Hyperamie als Heilmittel* (1903, 6th ed., 1907, Eng. trans. by G. M. Blech under the title *Bier's Text-book of Hyperamie as Applied in Medicine and Surgery*, 1909), *Ueber das Bezeichnung des Telologischen Denkens in der Praktischen Medizin* (1910).

BIERBAUM, bër'baum, OTTO JULIUS (1865-1910). A German author, born at Grunberg, lower Silesia. He successively took up the studies of philosophy, Romance philology, history of art, and Oriental languages, visiting the universities of Zurich, Leipzig, Munich, and Berlin. In 1892 he became editor of the *Freie Bühne* in Berlin (later the *Neue Deutsche Rundschau*), the publication of which he abandoned to found the art journal *Pan*, which, in collaboration with Julius Meyer-Graefe, he conducted till 1895. His publications include *Erlebte Gedichte* (1892), *Studentenbeichten* (1897), *Die Friesenfahrten und Friesenmeinungen des vierzehnten Jahrhunderts* (Herrn Pankrazius Grauer) (1897), *Der bunte Vogel von 1897*, *Ein Kalenderbuch* (1896), *Der bunte Vogel von 1899*, *Ein Kalenderbuch* (1898), *Irigenen der Liebe* (1901), a collection of poems, *Stella und Antonie*, a drama (1903), *Eine empfindsame Reise im Automobil* (1903), *Das Cenci der Mautesel* and *Die Schlangendame*, plays (1905), *Urban*, *Die literarische Gegenwart 20 Jahre deutschen Schriftstums, 1888-1908* (Leipzig, 1908). A light-hearted, nature-loving spirit romps through his comedies and stories and breathes in his melodious lyrics. His collected works were published in 1908, and his reminiscences at Munich in 1912.

BIERCE, bër's, AMBROSE (1842-). An American journalist and author, born in Ohio. He served with distinction in the Civil War, was breveted major, went to California in 1866 and to London in 1872. In London he contributed to *Fun* fables purporting to be translations from the Zambesi and the Parsi, and published

later in *Cobuebs from an Empty Skull*. Returning to California, he contributed to the *Oakland Monthly* and for many years to the "Prattle Columns" in the *San Francisco Examiner*. He edited *The Argonaut and Wasp* in California (1877-84). In more recent years he has been editorially connected with the *Cosmopolitan Magazine*. His more noteworthy books are *The Monk and the Hangman's Daughter*, with Dr. A. Danagier (1892), *In the Mist of Life* (1894), *Can Such Things Be?* (1898), *Fantastic Fables* (1899), *Shapes of Clay* (1905), *The Cymic's Word-Book* (1906), *The Shadows on the Dial and Other Essays* (1909), *Write it Right* (1909). His collected works in 12 volumes appeared in 1913.

BIERNATZKI, bér-natz-ké, JOHANN CHRISTOPH (1795-1840). A German author and clergyman. He was born at Elmshorn, in Holstein, studied theology and Oriental languages at the universities of Kiel and Jena, then served as a Lutheran pastor at Friedrichstadt in the province of Schleswig from 1825 to 1840. His most important tale is *Die Hallig, oder die Schifferbrüder auf dem Eiland in der Nordsee* (1836, 4th ed with introduction by Duntzer, 1881), which is still valued for its accurate description of personal experiences during the floods which frequently desolated Schleswig. His complete works, including tales, poems, and didactic treatises, were published after his death (8 vols., Leipzig, 1852). Consult his biography (Leipzig, 1852), by his son Karl Bernhard Biernatzki.

BIER'S HYPERÆMIA. A method of treating certain local inflammations by increasing temporarily the blood supply of the part. Acute and chronic joint diseases, infections, abscesses, spina, neuralgia, and rheumatoid arthritis are so treated. Active or passive hyperæmia may be induced—the former by directing a current of hot air upon the affected area, or placing the part in a hot-air box heated from 144° to 230° F. Passive hyperæmia is brought about in one of two ways, suction or constriction. Suction is accomplished by glass vacuum cups ingeniously fashioned to fit different parts of the body and connected with a rubber bulb by means of which the air is exhausted. This causes a rush of blood to the part, and congestion, i.e., hyperæmia, is produced. In treating the larger joints or extremities constriction is most convenient. A bandage, generally of rubber, is applied above the joint to be treated, lightly enough to obstruct the return venous flow, but not the arterial circulation. Bier's hyperæmic treatment must be used with skill and discretion, or it may do harm. Bandages and cups are applied intermittently, for definite lengths of time, and the circulation watched lest sloughing or gangrene occur. The method is based on the observation that increased blood supply results in increased phagocytosis, rapid tissue repair, and heightened local resistance, and is nothing more than an attempt to reproduce or accentuate in a definite, systematic way, nature's process of healing. The same effects are obtained by poulticing, counter-irritation, dry cupping, etc., but in a less exact and controllable manner.

BIERSTADT, bér'stat, ALBERT (1830-1902). An American landscape painter. He was born at Cologne, near Düsseldorf, Germany, received a common-school education at New Bedford, Mass., in 1853-57 studied at the Düsseldorf Academy under Lessing, A. Achenbach and

Leutze, and for a short time at Rome. In 1857 he opened an atelier in New Bedford, Mass., and the following year he made a sketching tour in the Rocky Mountains, largely in conjunction with the expedition of Gen. F. W. Lander to survey an overland wagon route. Leaving the party, with only two companions he undertook a dangerous journey in the eastern Rockies. Later (1863) he again visited the Rockies, Salt Lake City, the Sierras, San Francisco, and the Yosemite. From these and other travels he collected materials for his most important works. He was elected a National Academician in 1860 and received numerous decorations and medals in Austria, Belgium, and Germany. His studio was at Irvington-on-Hudson, N. Y., until 1882 and subsequently in New York City. Trained in the Düsseldorf school of landscape, he was skillful as a draftsman, although as a colorist somewhat hard and dry. The Düsseldorf method he applied to the interpretation of the vast scenery of the Rockies and the Sierras, and with F. E. Church and Thomas Moran, introduced a spacious, panoramic manner into American national art. His study of nature was direct and patient, his rendering of it, in the panoramic landscapes which made him famous, was empty and theatrical. The smaller canvases of his early period, like the "Arch of Octavian" (Boston Athenæum), are much better. His more ambitious works include "Rocky Mountains" (1863, Metropolitan Museum, New York), "North Fork of the Platte" (1864), "El Capitan, Merced River" (1866), "Storm in the Rocky Mountains" (1866), "Valley of the Yosemite" (1866, Public Library, New York City), "Valley of Kern's River" (1875), "Mount Corcoran, Sierra Nevada" (1878, Corcoran Gallery, Washington, D. C.), and two historical paintings, "The Discovery of the Hudson River" and "The Settlement of California" (both in the Capitol at Washington). Consult Tuckerman, *Book of the Artists* (New York, 1867).

BIESBOSCH, bies'bósk (Dutch, the reedy thicket). A marshy sheet of water lying just southeast of Dort, Netherlands, and partly separating the provinces of North Brabant and South Holland. It was formed in November, 1421, by an inundation which destroyed 72 villages and 100,000 people and covered an area of 80 square miles. Since the eighteenth century a considerable portion of the submerged area has been reclaimed, thus forming a number of large islands (Map Netherlands, C 3). The Biesbosch forms the eastern end of the estuary known as the Hollandsch-Diep, into which flows the Maas (Meuse) River.

BIESTER, byás'tér, JOÃO ERNESTO (1829-80). A Portuguese dramatist. He was born in Lisbon, and began his literary career by articles published in 1851 in *O País*. In 1853 he produced his first drama, *Raphael*, on the stage in his native city. Though utterly lacking in local and national coloring, his works, which were about 60 in number, were for many years the most popular dramas on the Portuguese stage. Despite the fertility of his imagination and the morality of the subjects of his plays, he had little influence on the revival of the national Portuguese theatre. Among the best known of his plays are *Moodade de D. João V.*, a drama in five acts (with Rebello da Silva, 1858), *Os homens servos*, a comedy-drama (1858), *Prima-vera eterna*, a comedy-drama (1860), *Abnegação*, which won the prize in the dramatic

tourney (1861), and *Os dsfamadores*, a comedy (1866) Biester is the only Portuguese dramatist to write only in prose, and, in addition to his plays, he gave us one work of criticism, *Uma Viagem pela litteratura contemporanea* (1856) He was also the founder and first editor of the journal *Revista Contemporanea de Portugal e Brazil* (1859) In 1862 he was made a member of the Royal Academy

BIFROST, be'fröst, or **BIFRAUST** (Old Norse, the tremulous way, from *bifa*, to tremble + *rost*, way) The rainbow, which in Norse mythology was deemed to be a bridge between heaven (Asgard) and the earth (Midgard) or hell (Hela) It was used by the gods in their daily descent to the Urdar-fountain, and was guarded by Heimdal, god of light (qv) In the latter time the warriors of Muspelheim (land of fire), after having traversed great rivers, were to ride over the bridge to give battle to Odin and his associate gods, the bridge (*ásbrú*, Asabridge) was to break down, the wolf Fenrir, the Midgard serpent Loki, all the followers of Hel, and the frost giants were to unite in the war There was nothing in heaven or earth that should be exempt from fear in that terrible hour All the gods, led by Odin, were to come forth to war The evil powers were to triumph, and the whole universe was to be consumed with fire Consult Anderson, *Norse Mythology* (Chicago, 1901) See SCANDINAVIAN AND TRUTONIC MYTHOLOGY, BURI

BIGA, or **BIGÆ**, bi'gæ, which is the usual form before the second century A.D. (Lat. from *bis*, twice + *agum*, yoke) A term for a vehicle drawn by two animals and commonly applied to the Roman chariot used in processions or in the circus In shape it resembled the Greek war chariot—a short body on two wheels, low and open behind, where the charioteer entered, but higher and closed in front A good example is the marble biga in the Vatican Museum

BIG'AMY (OF *bigame*, from Lat. *bis*, twice + Gr. *γάμος*, *gamos*, marriage) In law the criminal offense of contracting a second marriage by one who is at the time a married person In ecclesiastical law, marriage being a sacrament of the Church and binding each party for life, a second marriage, the former having been valid, was deemed bigamous and was punished as such, whether the former spouse of the offending party was living or dead Although void by the canon law, ecclesiastical courts will recognize it so far as to entertain proceedings for the formal nullification of the second marriage In the criminal law of Great Britain and the United States bigamy (more properly called polygamy) is a statutory offense The earliest English statute on this subject, that of 1 Jas. I, c. 11 (1603), declared it a felony with benefit of clergy (qv) Blackstone says "the legislature thought it just to make it a felony by reason of its being so great a violation of the public economy and decency of a well-ordered State" The latest English statute (24 and 25 Vict, c. 100, § 57) treats it as a wrong against the chastity of the second spouse As the statute of James was enacted prior to the settlement of the English Colonies in America, it might have been accepted as a part of the common law of the States, and it was so accepted in Maryland Most of the States, however, and the Federal Legislature have enacted statutes modeled after the statute of James Under these the crime consists in going through the

ceremony of marriage with another person while having a husband or wife living A second, non-ceremonial or common-law marriage, so called, though valid but for the former marriage, will not in general support an indictment for bigamy The crime is cognizable only by the courts of the State where the second marriage occurs The present statute in England continues this rule so far as aliens are concerned, but makes punishable in England the bigamous marriage of a British subject, wherever it may have been contracted It is provided by statutes on this subject, generally, that they do not extend to any person by reason of a former marriage whose husband or wife shall have been absent for a specified period (in England seven years, in the United States often five years), and is not known to such person to be living, but is believed by such person to be dead, nor to a person whose former marriage shall have been dissolved or pronounced void by a valid decree of a competent court In 1882 Congress amended Section 5352 of the United States Revised Statutes, so as to bring the polygamous practices of Mormons within the definition of criminal bigamy In some States a person who knowingly enters into a marriage with a bigamist is declared to be guilty of the same offense Consult Stephen, *Digest of the Criminal Law* (5th ed., London, 1894), Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895), Evesley, *Law of the Domestic Relations* (2d ed., London, 1896)

BIG BEN The name of the bell in the Parliament clock tower, London, cast in 1858

BIG BETH'EL A small village on the peninsula between the York and James rivers, Va., 10 miles northeast of Fortress Monroe It was an outpost of Magruder's encampment at Yorktown early in 1861, 1800 Confederates being stationed here, and on June 10 was unsuccessfully attacked by Gen. E. W. Pierce, at the head of about 2500 Federals, acting under the directions of Gen. B. F. Butler (qv) The fight was characterized by a series of blunders on the Federal side, and General Pierce was soon forced to retire with a loss of 76 (including Major Theodore Winthrop), the Confederates having lost only 14 Consult *Official Records* (vol. 11, Washington, 1881-1901) and Johnson and Buell (ed.), *Battles and Leaders of the Civil War*, vol. 11 (New York, 1887)

BIG BLACK RIVER 1 An affluent of the Mississippi, rising in Choctaw Co., Miss., and after a southwest course of 200 miles flowing into the greater river 20 miles south of Vicksburg (Map Mississippi, E 5) It is navigable for nearly 60 miles to Bovina 2 A tributary of the Porcupine River, Alaska, into which it flows a few miles above the latter's junction with the Yukon River at Fort Yukon 3 One of the eastern feeders of Lake Winnipeg, Canada, which it enters in lat. 52° 20' N

BIG BLUE RIVER See BLUE RIVER

BIG BONANZA A popular play adapted by Bartley Campbell from a German source (1875)

BIG'ELOW, ERASTUS BRIGHAM (1814-79) An American inventor, born in West Boylston, Mass. He invented looms for weaving suspended webbing, piping cord, knotted counterpanes, carpets, coach leaces, etc., founded Clinton, Mass., the headquarters of the Bigelow Carpet Co., and was one of the original incorporators of the Massachusetts Institute of Technology. He pub-

lished *The Tariff Questions Considered in regard to the Policy of England and the Interest of the United States* (1863)

BIGELOW, FRANK HAGAR (1851-) An American meteorologist, born at Concord, Mass. He graduated at Harvard College in 1873, and at the Episcopal Theological School in Cambridge (Mass.) in 1880. He was assistant astronomer at the observatory in Córdoba, Argentina, and afterward was successively professor in Racine College (Wis.) and assistant in the *Nautical Almanac* office, Washington, D. C. In 1891 he was appointed a professor of meteorology in the United States Weather Bureau and in 1894 professor of solar physics at the Columbian University. He also became, in 1891, assistant rector of St. John's Church, Washington, and in 1898 was president of the Washington Philosophical Society. He invented an instrument for obtaining photographic records of stellar transits and endeavored to prove a connection between terrestrial magnetism, the aurora, and the solar corona. In 1904 he was made a member of the International Commission on Solar Physics and Meteorology. He became professor of meteorology at the Oficina Meteorológica in Córdoba, Argentina, in 1910. He published an important monograph on the *Solar Corona* (1899), *Studies on the Thermodynamics of the Atmosphere* (1907), and bulletins on evaporation, the circulation and radiation of the atmosphere, and synchronism between solar phenomena and terrestrial meteorology (Buenos Aires, 1911-13), *The Daily Normal Temperature and the Daily Normal Precipitation of the United States* (1908).

BIGELOW, JACOB (1787-1879) An American physician and botanist. He was born in Sudbury, Mass., graduated at Harvard in 1806, and began the practice of medicine in Boston in 1810. He was for more than forty years physician to the Massachusetts General Hospital and for a long time professor of materia medica and clinical medicine in Harvard. In 1820 he was one of the committee of five who formed the American Pharmacopoeia and assisted in establishing the nomenclature which substituted a single for a double word when possible. He was also the originator of Mount Auburn Cemetery. His works include *Nature in Disease* (1854), a *Brief Exposition of Rational Medicine* (1858), *History of Mount Auburn* (1860), and many papers on medicine and botany, chief among the latter being his *Florula Bostonensis* (1814). For many years he was president of the Massachusetts Medical Society.

BIGELOW, JOHN (1817-1911) An American journalist, diplomat, and miscellaneous writer. A graduate of Union College (1835) he was later admitted to the bar, practiced law for some years, but gradually exchanged this profession for that of journalism. From 1845 to 1846 he was inspector of the prison at Sing Sing, in 1849 he became joint owner of the *Evening Post* with William Cullen Bryant and was its managing editor until 1861, when he became consul at Paris. From 1864 to 1867 he was United States Minister to France. Returning to America, he was Secretary of State for New York (1875-77), and, after August, 1886, a trustee of the Tilden Fund for a New York public library. His more important publications are *Some Recollections of A. P. Berrery* (1869), *Molinos the Quietist* (1882), *Life of Samuel J. Tilden* (2 vols., 1895), *France and the Confed-*

erate Navy (1888), *The Mystery of Sleep* (1897). He edited *The Autobiography of Franklin* from a manuscript that he had discovered in France (3 vols., 1868), also the *Complete Works of Franklin* (10 vols., 1887-88), and the *Speeches of S. J. Tilden* (1886). In 1895, he was elected president of the board of trustees of the New York Public Library. In 1890 appeared his biography of William Cullen Bryant, and in 1909 was published a valuable and entertaining narrative of his diplomatic and social experiences under the title *Retrospections of an Active Life*, 2 vols.

BIGELOW, MAURICE ALPHEUS (1872-) An American biologist, born at Milford Centre, Ohio, and educated at Ohio Wesleyan, Northwestern, and Harvard universities. He served as instructor in biology (1894-95) at Ohio Wesleyan and as assistant and instructor in zoology (1895-98) at Northwestern. At Columbia University he became instructor in biology in 1899, adjunct professor in 1903, and professor of biology in 1907. From 1905 to 1910 he was editor of the *Nature-Study Review*, and he is also author of *The Early Development of Lepus* (1902), *The Teaching of Zoology in the Secondary School* (1904), *Applied Biology* (1911), *Teacher's Manual of Biology* (1911), *Introduction to Biology* (1913).

BIGELOW, MELVILLE MADISON (1846-) A distinguished jurist and law writer. He was born at Eaton Rapids, Mich., and was educated at the University of Michigan and at Harvard. He became successively lecturer in the law schools of the University of Michigan and of Northwestern University, and professor of law and dean of the Law School of Boston University. His researches into the sources of our legal system resulted in the publication of a scholarly work, *Placita Anglo-Normannica*, in 1879. His interest in the relation of law to social progress has found expression in numerous essays, addresses, and other works, especially in the volume *A False Equation. The Problem of the Great Trust* (1911). In addition to his American edition of *Jarman on Wills*, he published treatises on various branches of the law, among which the following are especially noteworthy: *The Law of Estoppel* (1872, 6th ed., 1912), *The Law of Torts* (1878-1901), *History of English Procedure* (1880), *The Law of Bills, Notes, and Cheques* (1895-1900), *The Law of Wills* (1898), *The Law of Fraudulent Conveyances* (1911).

BIGELOW, POULTNEY (1855-) An American author, historian, and traveler, the son of John Bigelow. After a cosmopolitan training in the United States, France, and Germany (where he was a fellow pupil of the present German Emperor), he was graduated at Yale in 1879 and from the Columbia Law School in 1882. Admitted to the bar, he abandoned the law, after a few years, for journalism and travel in the East, Africa, Europe, and the West Indies. He was editor of *Outing* (1885-87), London correspondent of *Harpers Weekly*, and correspondent of the *London Times* during the Spanish-American War. He has published *The German Emperor* (1889), *The German Emperor and his Neighbors* (1892), *Paddles and Politics down the Danube* (1892), *The Border Land of Czar and Kaiser* (1894), in gathering the materials for which he was expelled from the Russian Empire, *A History of the German Struggle for Liberty* (4 vols., 1896,

new ed, 1912), and *White Man's Africa* (1898) In 1905 he published in a New York magazine an alleged "exposure" of Panama Canal conditions, which was sharply challenged by the government as based upon insufficient knowledge of the subject

BIGELOW, ROBERT PAYNE (1863-) An American biologist, born at Baldwinville, N Y, and educated at Harvard and Johns Hopkins universities He became instructor in biology in 1893 and librarian in 1895 at the Massachusetts Institute of Technology In 1897-98 he was editor of the *American Naturalist*, and in 1895-1908 of the *Technology Quarterly* He is author of several papers on zoology and contributor of a series of biological articles in the *Reference Handbook of the Medical Sciences* (1900-04)

BIGELOW, SAMUEL LAWRENCE (1870-) An American chemist, born in Boston He was educated at Harvard, the Massachusetts Institute of Technology, and the University of Leipzig Having taken up work at the University of Michigan in 1898 as instructor in general chemistry and in 1901 as acting director of the laboratory of general chemistry, in 1907 he became professor of chemistry His publications include *Denatured Alcohol* (1907) and *Theoretical and Physical Chemistry* (1912)

BIGELOW, WILLARD DELL (1866-) An American chemist, born at Gardner, Kans After graduating from Amherst College he was assistant professor of chemistry in the Oregon State College in 1889-90, and instructor in chemistry in the Washington high school in 1890-91 He became chemist in 1891, chief of the Division of Foods in 1901, and assistant chief of the Bureau of Chemistry in the United States Department of Agriculture in 1903 From this last office he resigned in April, 1913, following the resignation of Harvey W Wiley His publications include the following bulletins *Pure Food Laws of European Countries Affecting American Exports* (1901), *Preserved Meats* (1902), *Foods and Food Control* (1902-04), *Tom Salts in Canned Foods of Low Acid Content* (1911)

BIGGLESWADE, big'iz-wad' A parish and market town of Bedfordshire, England, on the east bank of the river Ivel, about 10 miles southeast of Bedford (Map England, F 4) The region produces vegetables for the London market Pop, about 5000

BIGGS, HERMANN MICHAEL (1859-) An American physician, born at Trumansburg, N Y Educated at Cornell University and Bellevue Hospital Medical College, he became lecturer and professor of pathological anatomy in the latter institution in 1885 From 1892 to 1901 he was pathologist and director of the bacteriological laboratories and thereafter was general medical officer of the New York Department of Health In 1897 he was appointed professor of therapeutics and clinical medicine, and in 1907 associate professor of medicine in the University and Bellevue Hospital Medical College In addition to his other duties he assumed the directorship of the Rockefeller Institute for Medical Research, upon its organization in 1901 In 1913 he was chief of a board of experts appointed to make an investigation of health conditions in New York State, and in 1914 he was appointed State Commissioner of Health His publications include *The Administrative Control of Tuberculosis* (1904), and *An Ideal Health Department*, with C E A Winslow (1913)

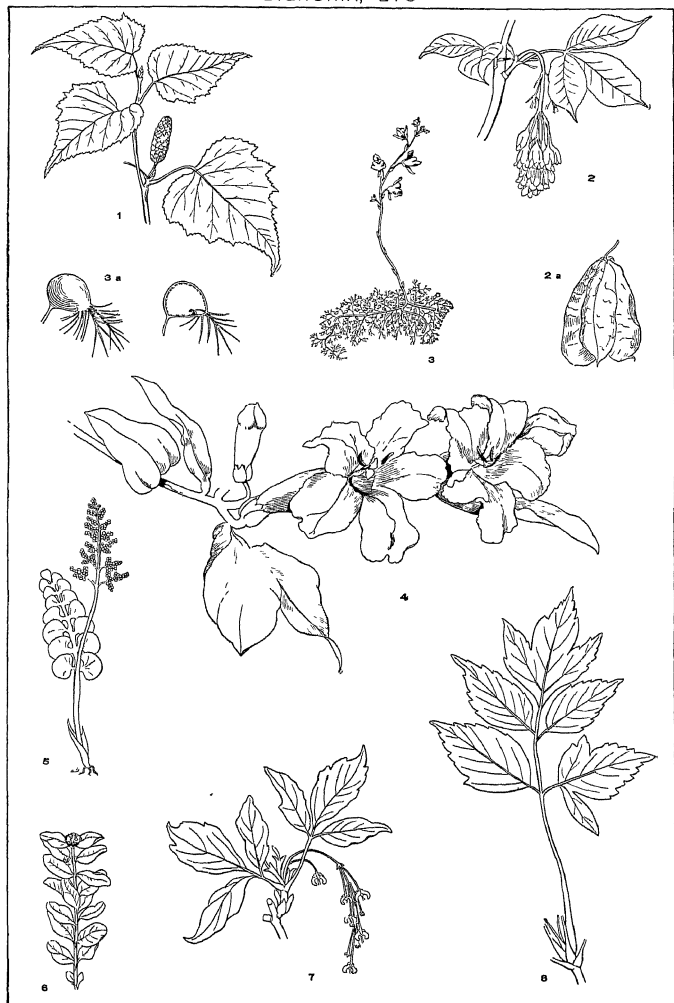
BIG HATCHIE, hăch'y A small river of the United States, rising in northeast Mississippi, one head branch in Prentiss County, but the larger one in Union County (Map Mississippi, H 1) It flows through a fertile cotton region north into Tennessee, and then northwest, joining the Mississippi River 5 miles above Randolph and nearly 40 miles above Memphis It is nearly 200 miles long, drains an area estimated at 4000 square miles, and is navigable for small steamboats for about 100 miles to Bolivar, Tenn

BIG HEAD' (OSTEOMALACIA or OSTEOPOROSIS) A disease of horses and mules in which the bones become more massive and less compact by reason of an increase in the cancellate tissue It arises from general malnutrition disturbances, which cause an increased absorption of lime salts from the bones The enlargement of the head is the most conspicuous symptom, hence the name A peculiar lameness precedes or accompanies other symptoms The ribs undergo certain changes so that a round-barreled horse becomes flat-sided Treatment includes a change of conditions both as to feed and surroundings In the early stages of the disease beneficial results have followed the supplemental use of lime given in the drinking water Feeds containing mineral salts, such as beans, cowpeas, oats, and cottonseed meal, may prove beneficial in replenishing the bony substance that is being absorbed See ACTINOMYCOSIS

BIG'HORN' The popular name in the United States of the Rocky Mountain sheep, on account of their immense, semi-spiral, argali-like horns These sheep, in one or other of their species, were formerly to be found throughout the whole Rocky Mountain system from New Mexico to the Arctic Circle, and they are still fairly numerous from Montana northward, but much less so southward, in the higher ranges They are gregarious, fond of the highest pastures, wary, and much hunted not merely for sport, but because the flesh is excellent and the horns make handsome trophies Wyoming, Montana, Idaho, and Washington still permit their killing There are perhaps less than 500 unprotected head in the four States In Colorado, where wild sheep have been protected for 25 years there are about 3500 animals After the pronghorned antelope the wild sheep will probably be the next large mammal of the United States to become extinct outside of game preserves

"To many American sportsmen and naturalists," remarks William T Hornaday (*Fifth Annual Report New York Zoological Society*), "there is no other wild animal on this continent which challenges admiration equal to that bestowed upon the mountain sheep Unfortunately, it is only those who have made the acquaintance of this animal in life, and upon its own ground, who have a fair conception of . . . the true character of this hardy mountaineer, in whose anatomy strength is combined with agility to an extent which is nothing short of marvelous Its home is the loftiest rim rock of the high mountain plateaus, or the most rugged and forbidding Badlands of the middle altitudes In summer its favorite pastures are the treeless slopes above timber line, and in winter it paws through the snow of the mountain meadows to reach the tallest spears of grass All the year round this animal is both well-fed and well-clad, and its savory flesh invites constant pursuit and attack from the mountain lion and

BIGNONIA, ETC



1 BIRCH (*Betula alba*)

2 BLADDERNUT (*Staphylea trifolia*), *a*, fruit

3 BLADDERWORT (*Utricularia vulgaris*), *a*, an utricle

of Bladderwort, entire and opened to show valve

8 BOX ELDER *a* mature leaf

4 BIGNONIA CHERERE

5 MOONWORT (*Lunaria annua*)

6 BOX (*Buxus sempervirens*)

7 BOX ELDER (*Negundo aceroides*), a flowering sprig

hunters both white and red. Unlike its dull-witted neighbor, the mountain goat, the mountain sheep is wide-eyed and wary, and difficult to approach."

The best-known species is the common bighorn (*Ovis cervina*), which is very stoutly built, stands about 40 inches high at the shoulder, is grayish brown, with the face ashy, a dark line along the spine, and the under parts and conspicuous "caudal disk" on the buttocks whitish. The horns of the ram are massive, thick and keeled on the outer edge, springing backward and then downward in a majestic sweep, and measuring 42 inches in largest specimens around the curve, those of the ewe are short and ribbed. It dwells in bands sometimes containing 50 or more of all ages throughout all the high mountains from the Dakota Badlands to Arizona, California, and northern British Columbia. A smaller and paler variety, inhabiting the central basin, is called Nelson's bighorn. A second species is Stone's bighorn, lately found in northern British Columbia, which is larger and has comparatively slender, pale-brown, outward curving horns, its general color is a blackish-brown grizzle, with the spinal stripe, throat, chest, sides, buttocks, and tail and hoofs almost black. Another species belongs to the mountains of Central Alaska, north of 60°, named *Ovis dalli*, which is altogether white, in winter perfectly free from the few brownish hairs that may appear in its summer coat. The horns are of moderate size and of a clear amber color. A fourth species, also Alaskan, has been described as *Ovis fannini*, and resembles Dall's sheep, except that the body is brownish gray, leaving the head, neck, breast, belly, and rump white. See Plate of WILD SHEEP, etc., accompanying article SHEEP.

Consult Mayer (editor), *Sport with Gun and Rod* (New York, 1883), Roosevelt, *Hunting Tips of a Ranchman* (ib., 1883), Baillie-Grohman, *Camps in the Rockies* (London, 1882), Lydekker, *Wild Oxen, Sheep, and Goats* (London, 1898), *Fifteen Years' Sport and Life in Western America* (ib., 1900). For an account of the Mexican bighorn, consult Hornaday, *Campfires on Desert and Lava* (New York, 1908), Lydekker, *The Sheep and its Cousins* (London, 1912).

BIG HORN A river of the Rocky Mountain region of the United States, rising in the Wind River Range in Fremont Co., Wyo., near the central part of that State (Map Wyoming, C 2). It flows northward into Montana and, following thence a northeasterly course, it empties into the Yellowstone River, of which it is the chief tributary. Its principal headstream is the Wind River, which rises in the Shoshone Mountains in Wyoming, southeast of the Yellowstone National Park. Its source is between 8000 and 9000 feet above sea level. The principal tributaries of the Big Horn are the Grey Bull and Stinking Water rivers in Wyoming and the Little Big Horn River in Montana. Its total length is about 450 miles, and it is navigable up to its junction with the Little Big Horn at Fort Custer. The famous Custer massacre took place in the valley of the latter in 1876. The Big Horn drains an area estimated at over 20,000 square miles. The scenery along the river's course is magnificent.

BIG JAW See ACTINOMYCOSIS.

BIG LAUREL See MAGNOLIA.

BIGLOW PAPERS, THE The title of a series of satirical poems in Yankee dialect by James Russell Lowell. They appeared in two

parts. Part I, voicing the New England opposition to the Mexican War, was brought out in 1848, and Part II, concerned with the Civil War, in 1867. Their fictitious editor is the Rev. Homer Wilbur. Lowell's wit and humor are here unstinted. Written rapidly and with great enjoyment, the work was warmly received, and parts of it are still popular.

BIGNON, bé'nyon', LOUIS PIERRE ÉDOUARD (1771-1841). A French diplomat and historian, born at Guerboville, in the department of Seine-Inférieure. During the Revolution he entered the army as a volunteer, but transferred, after some years, to the diplomatic service, and in 1801 was made Secretary of Legation at Berlin, becoming in the following year charge d'affaires. He subsequently was Minister Plenipotentiary to Cassel (1804-06) and, after the battle of Jena, was Administrator of Finances and Public Domains in the Prussian provinces occupied by the French. After acting as French Ambassador at the court of Baden and as Administrator General in Austria (1809) he was sent in the following year on a secret mission to Warsaw, where he remained for three years. His encouragement and advice contributed to arouse the Poles to an energetic resistance against Russia and Austria. After the fall of Napoleon he lived in retirement, but during the Hundred Days became Undersecretary of State for Foreign Affairs, and subsequently head of that department. From 1817 to 1837 he was a member of the Chamber of Deputies, and from July to November, 1830, held the portfolio of foreign affairs, but was soon removed because of an attack on the reactionary allies in his *Du Congrès de Troppau* (1821) and *Les cabinets et les peuples* (1822). Designated by Napoleon, in his will, to write the diplomatic history of France after the establishment of the consulate, Bignon performed his task in the *Histoire de France sous Napoléon* (14 vols., 1820-50). He also wrote *Exposé comparatif de l'état financier, politique et moral de la France et des principales puissances de l'Europe* (1815).

BIGNONIA (named after the Abbé Bignon). A genus of Bignoniaceae embracing about 150 species of twining shrubs. According to some authors the genus should include only two species. Most of the species are South American, although one, *Bignonia capreolata* (cross vine), occurs in the United States from Illinois to Virginia and south to Louisiana and Florida. Many of the species are cultivated in greenhouses for their striking habit of growth. They climb by twining and by tendrils. The flowers of many are very handsome. The long flexuous stems are frequently used as cordage substitutes, and the natives of French Guiana are said to weave the split stems into mats, baskets, etc. Near relatives of *Bignonia* are *Tecoma* (trumpet creeper) and *Catalpa*.

BIGOD, big'od, HUGH (?-1176 or 1177). First Earl of Norfolk, a son of Roger Bigod, who had come to England with William the Conqueror. The origin of the family name has been ascribed to the oath "bi got," frequently used among the Normans. Bigod is said to have secured the throne for Stephen by swearing to Archbishop William Corbois, immediately after the death of Henry I, that the latter on his deathbed had quarreled with his daughter Matilda and had disinherited her in favor of Stephen of Blois, whose arrival in England shortly afterward seemed to substantiate this statement. In

recognition of his services Bigod subsequently received the Earldom of Norfolk

BIGORDI, bê-gôr'de The real name of a family of Florentine painters, better known as Ghirlandajo (qv)

BIGORRE, bê-gô'r' (from the Gallic people *Bigerri*, or *Bigerriones*) A mountainous district in the southwest of France, formerly constituting a part of Aquitaine and subsequently of Gascony. It is now included in the department of Hautes-Pyrenees. The wines and baths of Bigorre are world famous. In mediæval times it was ruled by counts of the houses of Foix and Albiet and was united to France on the accession of Henri IV. Tarbes (qv) has been the chief town since the days of the Romans. Consult Froidout, *Memoire du pays et des etats de Bigorre* (Paris, 1892)

BIGOT, bê-gô'r, CHARLES JULES (1840-93) A French writer and critic, born in Paris. He received his education at the Ecole Normale and at the Art School at Athens and, devoting himself to journalism, became one of the leading critics and reviewers of his day. He wrote for the *LXXe Siecle*, and to the *Revue Bleue* contributed the popular *Annales politiques et litteraires*. Among his books are *Les classes dirigeantes* (1876), *Le clergé français devant la loi française* (1877), *Le petit Français* (1882), *Raphael et la Farnesine* (1884), *Gyccce, Turquie, le Danube* (1886), *De Paris au Magara* (1887). His wife, MARY HEALEY BIGOT, of American parentage, is the author, under the pseudonym of "Jeanne Mariet," of a number of successful novels dealing with contemporary life, of which *Marca* (1882) was crowned by the Academy. Other titles are *Une folie* (1886), *La tache du petit Pierre* (1887), *Artistes* (1890). She is also an accomplished translator from the French.

BIG RAPIDS A city, and the county seat of Mecosta Co., Mich., 65 miles north of Grand Rapids, on the Muskegon River, here crossed by two bridges, and on the Grand Rapids and Indiana and the Pere Marquette railroads (Map Michigan, D 5). It has a public library, hospital, theatre, and a fine courthouse, and is the seat of the Ferris Institute. Good water power is supplied by the river, and the city has an extensive lumber trade and manufactures of furniture, veneer, doors, sash, blinds, bed-spring frames, and flour. Settled in 1859, Big Rapids was incorporated 10 years later. The water works are owned and operated by the city. Pop., 1890, 5303, 1900, 4686, 1910, 4519.

BIG SANDY A navigable affluent of the Ohio River, formed by the junction of two main forks on the border between Kentucky and West Virginia and flowing north to the Ohio, separating these two States (Map West Virginia, B 3). The east fork, called Tug Fork or Tattawavka River, rises in West Virginia, near the Virginia line and, flowing northwest, forms with the Big Sandy the southern boundary between West Virginia and Kentucky. The west fork, called the Louisa Fork, rises in southwest Virginia and flows northwest into Kentucky and then northeast to its junction with Tug Fork. Both branches pass through a heavily wooded country, but the best timber has been removed. The river drains an area of over 4000 square miles and lies in the Ohio coal-producing area. It empties into the Ohio River near Catlettsburg, Ky., and is navigable for small boats for 100 miles.

BIG SPRING The county seat of Howard

Co., Tex., 270 miles west of Fort Worth, on the Texas and Pacific Railroad (Map Texas, D 3). The city contains a hospital, fine high and business school buildings, cotton gins, and an ice plant. It is an important railroad town, with division shops and offices of the Texas and Pacific, and has a considerable trade in the products of the surrounding region, principally live stock, hides, fruit, lumber, cotton, and agricultural produce. Extensive deposits of salt underlie the town, and near it is a large spring from which it is named. The water works are owned by the municipality. Pop., 1910, 4102.

BIG STONE GAP A town in Wise Co., Va., 175 miles (direct) south by west of Charleston, on the Louisville and Nashville and the Virginia and Southwestern railroads (Map Virginia, B 5). The town contains a historic museum, the Bee Rock Tunnel, a beautiful park, and a fine government building. Although the surrounding region is rich in timber and mineral deposits, Big Stone Gap is essentially a residential town. Pop., 1900, 1692, 1910, 2590.

BIG TREES See SEQUOIA

BIG WARRIOR See BLACK WARRIOR

BIHAC, or **BIHATCHE**, bê'hôch A fortified town of Bosnia, capital of a district of the same name. It is situated on an island in the Una, near the frontier of Dalmatia (Map Austria-Hungary, D 4). The Fethija Mosque, one of the important buildings, was converted from a Gothic church by the Turks in 1592. It has been the scene of frequent contests during the Turkish wars. In September, 1878, the town was successfully defended by the Bosnian insurgents against the Austrian army of occupation. Pop., 1895, 4330, chiefly Mohammedans, 1910, 4629.

BIHARI, bê-hîr'e, or **BHARS**, bûz Natives of Bihar or Behar, in northern India, also found in Oudh and to the south of the river Jumna. Some of them represent a fine type of Aryo-Dravidian intermixture. They were possibly once the ruling race of the plains, and the lower classes are undoubtedly of Dravidian ancestry. Crooke styles the Bhars a "remarkable race," and Haddon (1909) notes that they have contributed to the Rajput clans. The Bihari language is spoken by some 35,000,000 people. Consult Grierson's *Bihar Peasant Life* (1885) and other works, also Crooke's *Natives of Northern India* (London, 1907).

BIHE, bê'a A portion of the Portuguese West African Colony of Angola (qv)

BIJAPUR, bê-jû'pûr' (Skt *vijaya*, victory + *puri*, city) A decayed city in the presidency of Bombay, British India, on an affluent of the Kistna, 245 miles southeast of Bombay (Map India, C 5). Bijapur was for centuries the flourishing capital of a powerful kingdom, falling therewith under various dynasties in succession, Hindu and Mussulman, till in 1686 it was captured by Aurangzeb. Early in the eighteenth century it passed into the hands of the Mahattas. On the overthrow of the Peshwâ, in 1818, it was assigned by the British to the dependent Rajah of Salara. Bijapur presents a contrast perhaps unequalled in the world. lofty walls, of hewn stone, still entire, enclose the ruins of a city which is said to have contained 1800 mosques and 100,000 dwellings. With the exception of an ancient temple, the sole relic of aboriginal domination, the ruins are Mohammedan and consist of beautiful mosques, colossal tombs, and a fort of more than 6 miles in

circuit, with an inner citadel. An additional wonder of the place is the largest piece of brass ordinance in existence, cast at Ahmednagar. Pop., 1901, 23,811, 1911, 27,615. Consult Ferguson, *History of Indian and Eastern Architecture* (London, 1876), id., *Study of Indian Architecture* (ib., 1887).

BIJAYANAGAR. See VIJANAGARA.

BIJNS, bins, ANNA (c1494-1575). A Flemish poet. She was born at Antwerp and was the first writer of the sixteenth century in her native language. Her best-known verses are collected in her *Schoone Refereynen Schruftuoren ende Leevingen teghen Talle Kettereyen* (1528, with commentaries by Van Helden and Jonckbloet, 1876), which were frequently republished and won for the author the name of "Sappho of Brabant." Most of these poems are directed against Luther and his adherents, but all are written in a language of singular purity for that period. Those which are free from religious intolerance show more poetic fire than is found in the works of her contemporaries. A collection of 94 of her other poems was published by Van Helden (1886).

BIJUGA ISLANDS. See BISSAGOS ISLANDS.

BIKANER, bē'ka-nēr'. The capital of the native state of the same name in Rajputana, India, situated in a desolate tract, 250 miles west-southwest of Delhi in lat 28° N and long 73° 22' E (Map India, B 3). Population, 1901, 53,100, 1911, 55,826. It is surrounded by a battlemented wall 6 feet thick, 15 to 30 feet high, and 3½ miles in circuit, and from a distance presents a magnificent appearance with its carved Jain monasteries, palace, and buildings, but inside, the streets are narrow and, like the inhabitants, dirty. Immediately to the northeast is a detached citadel, of which the Rajah's residence occupies the greater part. The state of Bikaner is in lat 27° 30' to 29° 55' N and long 72° 30' to 75° 40' E, measuring, in its extremes, 160 miles by 200 miles. It contains 23,311 square miles. Pop., 1901, 584,627, 1911, 700,983. The Rajputs are the predominant race, but the Jats form the great body of the inhabitants. The people find their principal resource in pasturage, especially the raising of camels and fine horses, yet water is remarkably scarce. In the whole territory there is not one perennial stream, while wells, as precarious and scanty as they are brackish and unwholesome, average 250 feet in depth. In 1868-69 nearly half of the population were destroyed by famine. The temperature varies greatly. In the beginning of February ice is formed on the ponds, and in the beginning of May the thermometer stands at 123° F. in the shade. In the beginning of November each period of 24 hours, as the sun is above or below the horizon, presents such extremes of heat and cold as often to be fatal to life. Consult Warner, *Native States of India* (London, 1910).

BIKELAS, bē-ka'las, DIMITRIOS (1835-1908). A modern Greek poet and historian. He early attracted national attention by his patriotic hymns and has rendered into modern Greek several plays of Shakespeare. His chief historical works have appeared under the titles *The Greeks of the Middle Ages* (1878), *The Role and the Aspirations of Greece in the Eastern Question* (1885), *Greece, Byzantine and Modern* (1893). He also published *Stichoi* ('poems,' 1862), and *Loukas Laras* (a novel, 1879, English trans., 1881).

BILA-AN, bé-la'an. A primitive mountain tribe living on both slopes of the Matutum mountain range of southern Mindanao and in the Sarangani Islands. See PHILIPPINES.

BILASPUR, bé-las'pooi'. A town of the Central Provinces, British India, capital of the district of the same name (Map India, D 4). It is situated on the river Arpa and on the Bengal-Nagpur Railway. Pop., 1901, 18,937, 1911, 19,850. The district of Bilaspur comprises 7618 square miles. Pop., 1901, 918,491, 1911, 1,146,223. Rice is the principal agricultural product, and famines are frequent.

BILBAO, bé-ba'o (Basque *Ibaizabal*, under the hill). A seaport town of Spain, capital of the province of Vizcaya, situated in a mountain gorge on the Nervión, about 8 miles from its mouth at Portugalete (Map Spain, D 1). Bilbao is well built, the principal streets are straight, and the houses substantial. Five bridges, one a stone bridge of the fourteenth century, cross the river which divides the old town from the new. There are several fine public walks, numerous fountains, but no public buildings of any note. The city is purely commercial. It has many extensive rope works, and manufactures of hardware, leather, hats, tobacco, and earthenware. There are also docks for building merchant vessels, and in the vicinity are iron and copper mines. The Nervión has been deepened so as to be navigable by vessels drawing 22 feet, and at present Bilbao is one of the most important trading ports of Spain. The imports consist chiefly of cotton and woolen manufactures, colonial produce, fish, furs, spirits, hardware, machinery, etc., and the exports consist of wool, iron, steel rails, fruits, oil, flour and grains, wines, madder, minerals, liquorice, etc. For centuries Bilbao has been celebrated for the excellent quality of its sword blades, and in England a good sword was called a Bilbao even in Shakespeare's time. The women here do almost all the heavy portage. Bilbao owes its present prosperity to the iron mines which stand on the left bank of the Nervión. Their valuable deposits were known to exist from the earliest times, but the mines have only been worked within the last decades of the nineteenth century. Bilbao was founded in the year 1300 by Diego Lopez de Haro, under the name of Belvaio, i.e., 'the fine ford,' and, being well situated and little disturbed by the civil wars of Spain, it soon attained great prosperity. In the fifteenth century it was the seat of the most authoritative commercial tribunal in Spain. It suffered severely in the wars with France, first in 1795, and again in 1808, when 1200 of its inhabitants were slaughtered in cold blood. During the wars of 1833-35 and 1872-76 it was often vainly besieged by the Carlists. Pop., 1900, 83,306, 1910, 92,514. Consult Guindarri, *Historia de Bilbao* (Bilbao, 1905).

BIL'BERRY. See HUCKLEBERRY.

BILBILIS, bé'l'bē-lēs. An old Celtic town of Spain, about 2 miles east of the modern town of Calatayud, in the province of Saragossa. Chiefly celebrated as the birthplace of the poet Martial, it is also famed for its highly tempered steel blades. Under the Romans Bilbilis was a municipal town with the surname of Augusta and possessed the right to coin money.

BIL'BOES. See IRONS.

BILDERDIJK, bil'dér-dik, WILLEM (1756-1831). A Dutch poet, philologist, and philosopher. He was born in Amsterdam, Sept. 7,

1756, became famous as a poet while quite young, studied law in Leyden, and then practiced it at The Hague. In 1795 he was exiled as an anti-Revolutionist and went to London and Brunswick, after a discreditable love affair with Katherina Schweikhardt, redeemed later (1802) by marriage. Katherina was herself author of a narrative poem *Rodrigo the Goth* and of graceful *Poems for Children*. On Bilderdyk's return to Holland (1806) King Louis Napoleon made him librarian and patronized him in various ways, but he was rather overweening and ungrateful, and at last, refusing to live in Amsterdam, went to Leyden (1817), where he lectured on history till 1827. Bilderdyk's industry was indefatigable. While in Germany he translated *Ossian* and wrote *Country Life and Patriotic Love for Orange*. After his return he wrote *The Disease of Genius*, *Leyden's Battle*, several dramas, and his poetic masterpiece, *The Destruction of the First World*. His poetry had no deep sentiment and never caught the romantic inspiration. In politics he stood, in later years, almost alone as an ultra-conservative. His greatness lies in a mastery of language that no Dutch poet since Huygens had approached. Bilderdyk's *Works* are collected in 15 vols (1856-59). Consult Gorter, *Bilderdyk* (Amsterdam, 1871), Allard Pierson in *De Gids* for 1866, Kollewijn, *Bilderdyk zyn Leven en zyn Werken* (2 vols., Amsterdam, 1891).

BILE (Lat *bilis*, bile, anger). A fluid secreted by the liver. It is bright golden-red in man and in omnivorous or carnivorous animals, and green in the herbivora. The primary (parenchymatous) cells of the liver separate the bile from the blood of the portal veins and discharge it into small ducts, which unite to form larger ones and eventually the right and left hepatic ducts. The latter unite to form the common hepatic duct, which is soon joined by that of the gall bladder (the cystic duct). This junction forms the common bile duct, which pierces the second part of the duodenum and, running obliquely in its walls for a short distance, opens on its mucous surface. The amount of bile secreted daily varies from 20 to 30 ounces, secretion being continuous, but much more active directly after meals. During the intervals of digestion bile accumulates in the gall bladder, whence it is poured into the intestines when required, the passage of the acid contents of the stomach over the intestinal orifice of the common bile duct furnishing the necessary reflex stimulus. Bile has a bitter taste and peculiar odor. Its specific gravity is 1.026, its reaction neutral or slightly alkaline. It is composed of water, bile salts (sodium glycocholate and taurocholate), a small quantity of fats, consisting partly of a complex body called lecithin, the pigments bilirubin and biliverdin, and bile taken from the gall bladder contains a considerable amount of mucus. Another constituent of bile is cholesterol, a peculiar substance resembling fat, but really an alcohol, which, with inspissated mucus and bile pigments in varying proportions, forms gallstones. The passage of these bodies through the cystic and common ducts gives rise to the agonizing paroxysms of pain known as biliary colic. When the flow of bile into the intestine is obstructed, this secretion is reabsorbed into the blood, and jaundice (qv) follows. The bile of salt-water fish contains potash, while that of land and fresh water animals contains soda. The function of this

fluid is to aid in the digestion of fats, stimulate peristaltic movements of the intestine, to disinfect its contents and prevent fermentation. See CALCULUS DIGESTION, JAUNDICE, LIVER.

BILFINGER, bil'fing-ēr, or **BULFINGER**, bul'fing ēr, GEORG BERNHARD (1693-1750). A German mathematician and philosopher of the Leibnitz-Wolffian school. He was the son of a Lutheran minister of Kannstatt, Württemberg, and, like several others of his family, was born with 12 fingers and 12 toes. He studied at Halle under Wolff, became professor of philosophy in 1721 and of mathematics also in 1724. In 1725, on Wolff's recommendation, he obtained a professorship in St. Petersburg, whence he was recalled in 1731. He gained the prize (1000 crowns) offered by the Academy of Science of Paris for a dissertation on the cause of gravity. Later in life he was a privy counselor at Stuttgart and greatly advanced the interests of public instruction and agriculture. Among his numerous works the most important is *Dilucidationes philosophæ de deo, anima humana, mundo* (1725, 3d ed., 1746), in which he expounded minutely and defended against its opponents Wolff's division of metaphysics into four branches.

BILGE (akin to *bulge*, a rounded protuberance, Lat *bulga*, a leathern bag). That portion of the bottom of a ship which is nearest horizontal than vertical. The bend in the frames which joins the bilge to the side is called the *turn of the bilge*. If the turn of the bilge is sharp, the vessel is said to have a *hard bilge*, if rounding, to have an *easy bilge*. If the bilge frames amidships run nearly horizontal, the ship is said to have very little *dead rise*, if they incline upward at quite an angle as they leave the keel, she has considerable *dead rise*. When a vessel strikes the ground with such force as to cause serious injury in the bilge, she is said to be *bilged*. The upper side of the floor timbers in a wooden ship, and of the inner bottom in a modern vessel, form, near the midship line, natural drainways for any water which may leak into or be formed in the ship, and are called *bilges*. The largest circumference of a cask is called the *bilge*.

Bilge Blocks. A series of blocks on which the bilges of a ship rest in a dry dock.

Bilge Keel. A V-shaped keel riveted to a ship's bottom near the turn of the bilge for the purpose of checking her rolling. These keels are very effective, and few large ships are now built without them. A comparison of the behavior of two 15,000-ton British battle ships, one fitted with bilge keels and one without them, showed that the gain in a rough sea was very great, at one time the ship without bilge keels was rolling 28 degrees each way, while her sister ship with keels 30 inches deep rolled only 11 degrees.

Bilge Keelson. An internal longitudinal stiffening plate or timber inside the bilges.

Bilge Water. The water which collects in the bilges. It has a peculiar fetid odor which is very strong if the bilges are not kept as clean as possible. In the ships of the navy bilges are pumped out at least once a day and carefully cleaned once a week. In wooden ships it is very difficult to keep the bilges clean, and sickness on board has often been ascribed to their foulness.

Bilgeways. A series of timbers on the launching ways on which rests the cradle, which supports the body of the ship in launching.

BILGUER, bil'gwēr, PAUL RUDOLF VON

(1815-40) A German chess player, born at Ludwigslust, at an early age one of the most accomplished players of his day. He frequently gave exhibitions of memory feats, such as playing two games simultaneously, without watching the board. He was one of the group of seven chess experts (called "The Pleiades") who were associated in the Berlin chess school, founded by Ludwig Bledow (qv). His *Handbuch des Schachspiels* (completed by Von Heydebrand and der Lasa, 7th ed., 1891) is regarded as an authority.

BILHANA, bel-ha'na. An Indian poet of the eleventh century. He was born in Kashmir and is supposed to have died in the Deccan. His *Vikramānādhavacarita* (ed. by Bühler, Bombay, 1875) contains a biographical account of King Vikramāditya. But his most celebrated work is the *Cānuśuratapanocticāhā*, a lyric poem of about 50 strophes, of which several versions have been preserved (ed. by Solf, Kiel, 1886). Consult Höfer's metrical translation in the *Indische Gedichte* (Leipzig, 1844).

BILHARZIA DISEASE (syn Bilharziosis, Egyptian hæmaturia). A tropical or subtropical disorder due to a parasitic trematode worm, the blood fluke. Two distinct species of this parasite are known, the African blood fluke, *Schistosoma hæmatobium*, being more common than the Asiatic variety, *Schistosoma japonicum*. Whether the ova of the parasite gain entrance to the body through the skin or by way of the mouth is not known, but the fully developed worm is found chiefly in the veins of the liver, intestine, and bladder walls. The symptoms of the disease arise from the irritation of the eggs rather than from the worm itself, and consist of anæmia, due to frequent attacks of hæmaturia, cystitis, vesical calculus, and general inflammation of the pelvic structures. Bilharziosis is a chronic affection and of itself rarely kills, but its victims become so exhausted by it that they readily fall a prey to other diseases. No specific treatment is known. The disease is occasionally found in temperate latitudes, and several cases have been recognized in the United States.

BILIM'BI See CARAMBOLA.

BILIN, be'lén (Bohem Bilina, from the river Biela, white). A town of the Austrian crown land of Bohemia, beautifully situated in the valley of the Biela, about 6 miles southwest of Teplice. It has important agricultural industries. Over 4,000,000 bottles of its famous alkali spring water are exported annually. Pop., 1890, 6000, 1900, 7800, 1910, 8345. Bilin contains a château of Prince Lobkowitz, and in the vicinity rises the remarkable isolated clinkstone rock, called the Borschen, or Bilner Stein.

BILIN The language of the Bogos (qv).

BILIOUS FEVER See INFLUENZA IN ANIMALS.

BILL, or BEAK See BIRD.

BILL (Lat *billā*, from Lat *bullā*, anything rounded, seal, stamp, edict, bull). In parliamentary law, a completed draft of a proposed legislative enactment. Ordinarily a proposed law retains the name "bill" from its introduction, whether, as in England, by the government or a private member or, as in the United States, by a member or a legislative committee, through all its parliamentary stages, until it has been enacted into law, when it becomes an act or statute. In the United States a bill is popularly known by the name of the member intro-

ducing it. Formerly the method of initiating legislation in the British Parliament was by petition to the sovereign, but this fell into disuse in the fifteenth century.

The drafting of legislation is a matter calling for great technical skill as well as a wide and intimate knowledge of law, both statute and common. In Great Britain government bills are prepared under the supervision of an expert, the clerk of the House of Commons, and even private bills must pass under his scrutiny before being introduced. In the United States, in Congress as well as in the legislatures of the several States, there has been great laxity in the preparation of bills, the form and scope thereof being determined by the individual legislators introducing them or by private, irresponsible persons seeking the legislation embodied in them. This condition of affairs, which has naturally resulted in much lax and confusing legislation, is now gradually giving way to a system under which the services of expert bill drafters are being brought into play. Bill-drafting bureaux have been established in connection with the Library of Congress at Washington and by the legislatures of several of the States, the most notable and successful of which is that of the State of Wisconsin. The New York State Library at Albany and Columbia University in the city of New York have also recently established such bureaux.

Bills are of two kinds, public and private, according as they by their terms affect the particular interest of any person or persons, whether private individuals or corporations, or the interests of the people at large. In the British Parliament bills for raising revenue can originate only in the House of Commons, and they are not subject to amendment by the House of Lords. In the United States Congress such bills must originate in the Lower House, but the Senate may propose and make amendments. See LEGISLATION. CONGRESS, BILL OF ATTAINDER.

In the Law of Pleading a bill is a form of pleading, by which actions are instituted, both at common law and in equity. (See BILL IN EQUITY, PLEADING.) In criminal law the written accusation or presentment of a grand jury is known as a bill. See BILL OF INDICTMENT.

BILLAUD-VARENNE, bë'yô'va'rën', JEAN NICOLAS (1756-1819). A French Revolutionist. He was a member of the National Convention in 1792, voted for the execution of Louis XVI, and favored in every way the most violent measures. He was subsequently president of the Convention and a member of the Committee of Public Safety. Though he assisted in the overthrow of Robespierre, he ultimately shared the fall of the Terrorists and was transported to Cayenne in 1795. He visited New York in 1816, but was coldly received and went to Haiti, where he died, 1819.

BILLBOARD See ANCHOR.

BILLERICA, bil'rik-a. A town in Middlesex Co., Mass., 18 miles northwest of Boston, on the Boston and Maine Railroad (Map Massachusetts, F. 2). The town contains repair shops of the Boston and Maine Railroad and woolen mills. It has a public library and owns the water works. Pop., 1900, 2775, 1910, 2780.

BILLET (Fr *billet*, a ticket, dimin of *bole*, bill, note). A naval term denoting the station or employment of an individual. A *sleeping billet* is the numbered space assigned to a member of the crew in which he is required to swing his

hammock A *station billet* is a memorandum of his station and duties furnished to each member of the crew, one is given to him when he first comes on board, and if he be afterward changed to another division or part of the ship, his station billet is changed accordingly.

In architecture, an ornament consisting of a series of short cylinders spaced along a straight line and formed by cutting a molding—generally a round molding—into notches, so that the parts left resemble billets of wood. When used in several rows, the billets and empty spaces are placed interchangeably. It is frequent in Norman buildings. See **HERALDRY**.

Billethead A scroll head of a ship at the end of the timbers underneath the bowsprit. It replaced the old figurehead in vessels of the middle and latter part of the last century.

BILLET, bé'ya', FÉLIX (1808-82) A French physicist born at Fismes (Marne). He became professor of physics at the University of Dijon in 1845 and dean of the faculty in 1873. His name has become associated with the apparatus known as the "Bilentesilles de Billet." His numerous important works include the following: *Sur les changements de volume des corps par le passage de l'état solide à l'état liquide* (1845), *Condensations électriques de deuxième et de troisième espèce* (1851), *Traité d'optique physique* (2 vols., 1858-59), *Mémoire sur les dédoublements d'interférences* (1862).

BILLETING (Fr. *bille*, ticket, dimin of *OF bille*, bill), or **QUARTERING** A system of provisioning and lodging soldiers, when not in camp or barracks. Before the era of permanent barracks in England, soldiers were billeted or quartered on the citizens, who were compelled to support them. The abuses and hardships endured by citizens generally because of this arrangement brought about the erection of permanent barracks. (See **BARRACKS**.) One of the grievances which led to the American Revolution was the quartering of British troops upon the people without their permission. At the present time "quartering" is restricted in the United States by the third amendment to the Constitution. In England it is confined to troops on the march and individual soldiers traveling on special duties. The keepers of inns or public houses, or citizens—failing the former—on whom troops may be billeted are paid according to a scale fixed by the government.

BILL-FISH A fish having the snout much drawn out in the form of a bill, as (1) a gar (see **GAR**), (2) spearfish (q.v.), or some similar form.

BILLHOOK An intrenching tool, used for cutting underbrush in clearing passages through jungle growths, etc., and clearing camping grounds or bivouacs. It is also used for securing materials for gabions, fascines, and other defensive supports. The regimental pioneers of European infantry carry a billhook as part of their equipment. The working holo of the Filipinos and the machete of the Cubans closely resemble it, both in practice and general use. See **ENGINEERING, MILITARY**.

BILLIARDS, bil'yairdz (Fr. *billard*, originally the cue, from *bille*, a log of wood, cf. Eng. *billet*) A game of skill, whose development as a scientific indoor game is wholly modern. Its origin is obscure. Some assert that it was brought from the East by the Crusaders. Cotton, in his *Complaisant Gamester* (1674), wavers between a Spanish and an Italian origin, but there is better

reason to believe that De Vigne, an artist of the court of Charles IX of France (c 1571), designed tables and drew up a code of rules. In any case it was known in England soon after this time. Spenser, in his *Mother Hubbard's Tale* (1591), speaks slightly of those who play—

"With dice, with cards, with behards far unfit,
With shuttlecock, musseuming manly wit"

It was originally an outdoor sport, played on the ground, at first with round stones, later with two balls, an ivory post, an upright cone called a king, and two sticks called masts (maces), made of heavy wood and tipped with ivory. (A modification of this game, called "Lawn Billiards," had some vogue during the latter half of the last century.) It was then played in a similar form indoors upon a table, still with two balls, an iron arch being used through which the ball was driven, beyond this was the king, and pin pool is a survival of this primitive form. In the eighteenth century holes, called "hazards," and suggested probably by the iron arch, were cut in the bed of the table—first in the centre, then at the corners and sides—into which the balls were driven. Then the French added the third, or red ball, introducing the carambole or carom game, which involves striking both the other balls with the cue ball.

The next period of development is marked by improvements in the materials of the game. Where the end of the cue had been simply made rough with a file so that chalk might adhere to it and prevent slipping off the ball, the French player Mangin introduced leather tips (first used in the United States in 1823), and a little later marble and slate came to be employed instead of wood for the bed, and india-rubber for the cushions. In 1854 a new cushion, possessing great durability and elasticity, was invented by Michael Phelan, the father of billiards in America, and the game in the next half-century attained a wonderful scientific precision.

The English game is played with three balls, two being white and one red, which generally measure 2 1/16 inches in diameter and weigh about 4 2/3 ounces. One of the white balls has a spot upon it, the purpose of which is that one ball may be distinguished from the other. The red ball is placed upon a spot at what is called the top of the table and about 13 inches from the top cushion, but exactly in the centre width of the table, at the other, or lower end of the table, and at a distance of 2 feet 4 1/2 inches from the lower-end cushion, and exactly in the centre width of the table, is placed a spot, and from this spot is drawn a semicircle, with a radius of 21 inches to 23 inches, of which the spot is the centre base, the space within the semicircle is called "balk." The object of the player is, by striking his own ball against the red ball or his adversary's, to drive either it or them into the pockets, or else effect a "cannon"—i.e., to strike both balls with the player's ball. The general limit of each game is "50 up," as it is called, although any number of points may be agreed upon.

The method of play is as follows for the lead and choice of balls, the players "string"—i.e., placing then white balls within the semicircle, they cause them to strike the furthestmost cushion and to rebound, the striker whose ball stops nearest the bottom cushion may take which ball he likes and play or direct his opponent to play, the red ball must, at the opening of the game,

be placed upon the top spot and replaced after being pocketed or forced off the table, or whenever the balls are broken—i.e., when the balls are played as in the opening stroke, the game is adjudged in favor of whoever first scores the number of points agreed upon. Two points are scored for a cannon or carom, two for a white hazard (pocketing the opponent's ball), three for a red hazard (pocketing the red ball). The following strokes count against the player: a simple miss, one point; a losing hazard (pocketing your own ball), two; and doing both at once, three.

Billiard tables vary in size. The playing area of the English table is 6 feet by 10½ feet; it has six pockets, one at each corner and one at each side at the centre, the standard size in America is a table 5 feet wide and 10 feet long, although in public rooms, clubs, and private houses the size generally used is 4 feet 6 inches in width and 9 feet in length. In the United States the game of billiards is now played almost exclusively on carom tables, pocket tables being reserved for the game of pool. The bed of the table is made of slate and is covered with fine green broadcloth, while rubber cushions are used at the sides and ends of the table, against which the balls strike and rebound. Three and four balls are used in playing the game, the balls being propelled with cues, which are generally made of ash or maple and in length vary from 4 feet 6 inches to 5 feet. A billiard cue is about 1½ inches thick at the butt end, while the tip runs to a point, in size from ⅝ to ¾ inch. In weight cues vary from about 14 to 22 ounces. Ivory balls are generally used, and in America and France the standard ball measures 2⅝ inches in diameter, in England 2 1-16 inches.

The original American four-ball game of caroms and pockets was played upon a 6 × 12 table, with six pockets. Two white and two red balls (light and dark in color) 2⅝ inches in diameter were used, but it is so seldom played now that it needs no further notice, its place having been taken by the four-ball carom game, which in turn is giving place to the more popular three-ball carom game. This is played in America and France with two white balls and one red. In professional contests a 5 × 10 carom table is used—i.e., a table without pockets, although it can be played on a table with pockets, counting only the caroms. The billiard table has three spots in a line, dividing the table lengthwise, running from the centre of the head cushion to the centre of the foot cushion, one of these spots, cutting the line in two equal parts, is called the centre spot, and the other two are situated half-way between the centre spot and the head and foot cushions. The spot at the head of the table is called the white spot, and the one at the foot the red spot. The centre spot is used only when a ball, forced off the table, finds both white and red spots occupied. Should the white ball forced off the table find its spot occupied, it would be placed on the red spot, and vice versa. In beginning the game the red ball and one white are placed on their respective spots, the other white remains in hand and is placed near the white spot previous to the opening stroke in the game. The player can take any position within six inches of the white spot, but he must strike the red ball first before a count can be effected. The cushion-carom game, in which the cue ball is required to strike one cushion after having hit the first object ball, is

now very general, while the two-cushion and even three-cushion contests are not infrequently played by amateurs as well as professionals.

What has come to be generally known as the "balk-line game" is a development made necessary by the wonderful skill acquired by the professional players of first rank in "cushion nursing," i.e., the making of an almost indefinite number of shots by getting the balls in a corner or against one of the cushions. With the balls in this position very skillful players (like Frank Ives, Jacob Schaefer, and George Slosson) are able to make runs of several hundred, such is their adeptness and delicacy of touch. To guard against this, lines were drawn running parallel to and, at first, eight inches from the cushions and completely crossing the table both ways. The rules of this game provide that the players shall be permitted to make only one or a given number of shots when one or both of the object balls are between the line and the cushion. The player is permitted to make as many carom shots as he can when the balls are entirely outside the balk lines, and although this space is, of course, relatively small, the more expert players frequently make runs of from 20 to 30 by extremely delicate carom playing with occasional forcing of one of the object balls to the cushion with such accuracy as to make it return to a position from which the carom playing may be continued. But with the further development of skill among professional players, this free space was decreased by increasing the distance of the balk line from the cushions first 14 and then 18 inches, while games occasionally provide for a 22-inch balk line. Again, the restrictions of play within these lines are made more exacting as the skill of the player increases, in many of the tournaments between professional players no shot may be counted when the balls are within the balk lines, unless one is forced over the line. The 18-inch balk-line game, one or two shots in, is the form usually prescribed for professional championship matches.

The only play upon balls against the cushion in most tournaments between professionals is one which provides that both object balls shall be within what is known as the "anchor space." These anchor spaces are rectangles about six inches long and three inches broad, drawn at the cushion line so that the balk line will divide each into two squares. If the player is skillful enough or fortunate enough to get the two object balls within this anchor space, he may make one shot, but he must at the same time drive one of the balls outside the space. If his skill is sufficient to make the ball or balls return to this anchor space, he may continue his play, but this, as may be supposed, is an exceedingly difficult feat.

Tournaments between professional players are generally arranged with the utmost exactness as to the smallest details of play. In many cases this niceness extends even to a definite requirement as to the temperature of the room in which the contest is to take place, because moisture or low temperatures affect the elasticity of the ivory of which the balls are made.

The following are some of the remarkable scores made in recent times, under the modern highly scientific developments. Straight rail—highest run for match play (3 balls, on regulation 5 × 10 table) 1531 points, Maurice Vignaux, Paris, 1880. Highest average for match play, 333⅓, by Jacob Schaefer, Chicago, 1879. Cush-

ion caroms, one cushion to be taken before hitting the object ball, or between the two object balls—highest run for tournament play, 85 points, Frank C Ives, Boston, 1896 Highest average for straight-cushion caroms, in tournament play, 10 (in 200 points), Jacob Schaefer, New York, 1883 Fourteenth-inch balk line, 2 shots in—highest run (with "anchor nurse" barred), 350 points, Frank C Ives, Chicago, 1894, (with "anchor nurse" allowed), 566 points by Jacob Schaefer, New York, 1893 Highest average (with "anchor nurse" allowed), 100, Jacob Schaefer, New York, 1893, and Frank C Ives, Chicago, 1894 Highest average (with "anchor nurse" barred), 632-10, Frank C Ives, New York, 1894 Highest amateur record run for tournament games, 202, by Calvin Demarest, Chicago, 1908 Highest amateur average for tournament games, 57½, by Demarest, 1908 Eighteen-inch balk line, 1 shot in—highest run for tournament play, 140 points in 500-point game, by F C Ives, 1897 Best average in tournament play, 3125, by F C Ives, 1897 Highest run in championship match, 100, by Jacob Schaefer, 1907 Best average in championship match, 20 83, by William Hoppe, 1906 Eighteen-inch balk line, 2 shots in—highest run for tournament play (with 5 shots allowed in anchor spaces), 290 points, by Ives, New York, 1896 Highest run (with "anchor nurse" barred), 234 points, by George Sutton, New York, 1906, and 255, by Louis Curé, of France, against Jacob Schaefer, in Paris Highest average for tournament games (with 5 shots allowed in "anchor spaces"), 50, by Ives, New York, 1896 Highest average for tournament games ("anchor nurse" barred), 100, by George Sutton, New York, 1906 Highest run for championship games, 232, by Sutton, 1907 Best average for championship match, 33 33, by Sutton, 1907 Highest runs, straight-cushion caroms, 85, by Ives, Boston, 1906, 398, championship game, Paris, 1882, 3-cushion caroms, 16, by George W Moore, New York, 1910, English billiards, 2106, by George Gray, of Australia, at London, 1911

Pool is played with billiard tables with fifteen numbered balls and one white unnumbered ball. This is the cue ball. The balls are placed on the table in the form of a triangle, the apex on the spot at the foot of the table. The player's object is to pocket as many numbered balls as he can, the number on each ball he pockets being scored to his credit. Pyramids is also played with fifteen red balls and one white one, the cue ball. The balls are placed on the center of the table in the form of a triangle, and the first player must strike them with the cue ball with sufficient force to cause two or more object balls to strike a cushion, or one at least to go into a pocket. The following player must distinctly call the number of the ball he intends to pocket, but he need not designate the particular pocket he intends to put it in. In Chicago pool, the fifteen balls are placed at intervals around the cushions. For the American game, consult *Modern Billiards*, published by the Brunswick-Balke-Collender Company (New York, 1905), Cady, *Billiards* (New York, 1896), Thatcher, *Championship Billiards, Old and New* (Chicago, 1898), Garner, *Scientific Billiards* (New York, 1880), Daly and Harris, *Daly's Billiard Book* (Chicago, 1913), for the English game, Broadfoot, *Billiards* (London, 1896), Roberts, *The Game of Billiards* (London, 1897), Ritchie, *Useful Strokes for Billiard Players* (London, 1910),

for the French game, Vignaux, *Le billard* (Paris, 1889)

BILL IN EQUITY The original process instituting an action or proceeding in a court of equity, corresponding to a *declaration* in an action at law, a *libel* in admiralty courts, or (in England) an *allegation* in a spiritual court. It is a complaint in writing addressed to the chancellor, giving the names of the parties to the suit, a statement of the matters on which the complainant relies, the allegations which he makes, an assertion that the matters complained of are contrary to equity, and a prayer for relief. By the former practice in the English court of chancery a suit in equity was initiated by a petition addressed to the lord chancellor, lord keeper, or lords commissioners for the custody of the great seal, as representatives of the king, unless the seal was in the king's hands or the chancellor was the petitioner, when it was addressed to the king himself—for, according to the theory of chancery, the plea was made to the king's conscience, i. e., for the exercise of the reserved powers of justice inherent in the crown. Where the crown was the tutor, complaint was by *information* (qv). But by the Supreme Court Judicature Act of 1874, which abolished the court of chancery as a separate tribunal and vested its jurisdiction and functions in the Supreme Court of Judicature of the Kingdom, all suits now begin by writ. Formerly the several jurisdictions of the United States followed the old chancery pleadings, but in New York and other States which have adopted codes of civil procedure the same pleadings are now established for equity as for common-law actions. Instead of the elaborate bill, the first pleading is now a complaint stating the facts "constituting the cause of action," with demand for judgment. In the non-code States the old bill is retained, though generally with statutory modifications in the direction of simplicity.

A bill may be either original, as when it initiates an action, or not original, as when it supplements an original bill or is brought by a third party intervening in the suit. Bills are characterized according to the nature of the remedy sought, as "bill of peace," "bill of interpleader," "bill of discovery," etc. See CHANCERY, EQUITY, PROCEDURE.

BILLINGS A city and the county seat of Yellowstone Co., Mont., 238 miles east by south of Helena, on the Yellowstone River, and on the Northern Pacific, the Great Northern, and the Burlington and Missouri River railroads (Map Montana, II 4). It is the commercial center of a vast stock-raising district, the exports of which consist principally of live stock and wool, the city being one of the largest inland wool markets of the United States. Its shipments of this product and of live stock are enormous. There are also flour and lumber mills, beet-sugar factory, railroad shops, foundry, a creamery, and brickyards. In the vicinity are deposits of coal, marble, and limestone. The city has a public library, an opera house, and a fine city hall and courthouse buildings. Pop., 1890, 836, 1900, 3221, 1910, 10,031.

BILLINGS, FRANK (1854—) An American physician, born at Highland, Iowa Co., Wis. He graduated at the Northwestern University Medical School (1881) and took post-graduate work in Vienna and Paris in 1885 and 1886. He was appointed professor of medicine at the

Northwestern University Medical School in 1870, and professor of medicine in 1898 at the Rush Medical College, Chicago, and dean of the faculty of that institution in 1900. He became professor of medicine in the University of Chicago in 1905. In 1905-06 he was president of the American Medical Association, and in 1907-08 president of the National Association for Study and Prevention of Tuberculosis. He became editor of the *Year Book of General Medicine* in 1901.

BILLINGS, JOHN SHAW (1839-1913). An American surgeon and librarian. He was born in Indiana, graduated at Miami University in 1857, and at the Medical College of Ohio three years later. He then entered the surgeon-general's department of the United States Army and during the Civil War served in the field and in hospitals until 1864, when he was transferred to the surgeon-general's office in Washington. There he became curator of the Army Medical Museum and Library and succeeded in making the latter the third largest and probably the most valuable medical library in the world. The *Index-Catalogue* of this library in 16 quarto volumes, which he prepared, is a work of the highest order. Dr Billings was also for a number of years professor of hygiene in the University of Pennsylvania. On the consolidation, in 1896, of the Astor and Lenox libraries with the Tilden Foundation into the New York Public Library, he was appointed chief librarian of the system. Among his publications are *Principles of Ventilation and Heating* (1884), *Mortality and Vital Statistics of the United States* (1885), *National Medical Dictionary* (2 vols., 1889), *Description of the Johns Hopkins Hospital* (1890), *Social Statistics of Cities* (6 vols. for the Eleventh Census), *Some Library Problems of Tomorrow* (1902), *Physiological Aspects of the Liquor Problem* (1903).

BILLINGS, JOHN. The pseudonym of the American humorist, Henry Wheeler Shaw (q.v.).

BILLINGS, LUTHER GUTHRIE (1842-). A rear admiral (retired) of the United States navy, born in New York City. Aboard the United States steamship *Water Witch*, when it was captured by Confederates, he was taken, wounded, to a Confederate hospital, and later was thrown into prison. After various adventures he was released from Libby Prison late in 1864 in exchange for a Confederate soldier, and was promoted 15 numbers in his grade for "eminent and conspicuous conduct in battle." He was made pay director with the rank of rear admiral in 1895 and general inspector of the pay corps in 1897. In the following year he was retired from active service.

BILLINGS, ROBERT WILLIAM (1813-74). An English architect and artist, born in London. He acquired during a seven years' apprenticeship with John Britton, topographical draughtsman, a taste for and facility in the preparation of illustrations of historic buildings. Between 1838 and 1849 he produced illustrations of several churches and cathedrals, as well as his *Architectural Antiquities of the County of Durham* (1846), and a *History and Description of St Paul's Cathedral and Churches of London* (1843). His chief work was entitled *Baronial and Ecclesiastical Antiquities of Scotland* (4 vols., 1845-52), with 240 illustrations. Under his direction Crosby-upon-Eden Church, Cumberland, the chapel of Edinburgh Castle, and the Douglas Room in Stirling Castle were restored.

BILLINGSGATE (Billing, presumably a former proprietor of the land). A gate, wharf, and fish market, a little below London Bridge. It was opened in 1558 as a landing place for provisions and in 1699 was made "a free and open market for all sorts of fish." The unpolished phraseology, native, though not peculiar, to this quarter of London, has given rise to the use of the name "Billingsgate" as a synonym for coarse or abusive language, such as is proverbially ascribed to fishwives.

BILLINGTON, ELIZABETH, née WEICHSFL (1768-1818). A celebrated English singer, born in London. She was the daughter of a German musician. At an early age she came forward as a performer on the piano and as a composer, and after marrying her music master, Thomas Billington, appeared with brilliant success on the operatic stage in Dublin in 1786. She perfected her musical education under Sacchini in Paris, and sang subsequently in Venice and Rome with the greatest success. After her first husband died, in 1799, she married a Frenchman of the name of Felissat and returned to London, 1801, where she received £4000 for six months, playing alternately at Covent Garden and Drury Lane. She retired from the stage in 1811 and died at her villa near Venice. Her private life was very stormy. To a voice of wonderful compass (of three octaves), trained in all the art of the Italian school, she added a fascinating personal beauty and grace. Consult G. F. Ferris, *Great Singers*, vol. 1 (New York, 1892).

BILLITON, bil'it-tôn', or BLITONG, blé-tông'. One of the Dutch East India Islands, situated between the islands of Banca (off the southeast coast of Sumatra) and Borneo (Map East India Islands, C. 5). It is compact in form and covers an area of 63 square miles, with a rough surface rising to 3000 feet, and has rich deposits of tin and other minerals. It is divided into five districts, under the jurisdiction of the governor-general of the east coast of Sumatra, and has a population (1905) of 36,858, of whom many are Chinese, but only about 100 are Europeans. The capital, Pandang, is on the northwest coast, and has a trade in coffee. The island is surrounded by coral reefs.

BILL OF ATTAINDER (for derivation see ATTAINDER). In English law, a bill introduced into Parliament convicting a person, without trial in an ordinary court of justice, of high crimes, such as treason or felony, and prescribing the penalty of death and the forfeiture of the estates of the person accused. Attainder (q.v.) was the ordinary consequence of a judicial conviction of treason or felony, but the method of procedure by bill in Parliament was resorted to in the case of offenders of too great power and influence to make their conviction in an ordinary judicial proceeding certain or in cases of grave civil danger when quicker action was demanded than that afforded by the ordinary process of indictment and trial. It was first employed in the Parliament of 1459 when a bill was presented attainting the Yorkist lords of high treason and declaring the forfeiture of their estates and dignities. During the next two centuries this was the method commonly employed of dealing with political offenders. It is now probably obsolete. By the Constitution of the United States Congress is forbidden to pass any bill of attainder (Art. I, Sec. 9, 3), and the constitutions of the several

States contain similar prohibitions on the acts of their respective legislatures. See **FORFEITURE**, of **BILL OF PAINS AND PENALTIES**.

BILL OF COSTS In England, the itemized statement of account for services rendered by a solicitor or attorney to his client. It is customary to render the items of this account in great detail, and it thereupon becomes the basis of the claim which the law gives the solicitor upon his client. The bill may be disputed by the client on the ground that it is unreasonable or that there was in fact no retainer or that it was not signed by the solicitor. It may be enforced by an application for a summary judgment. Barristers have no legal claim for compensation and hence are not privileged to render bills of costs.

In the United States a bill of costs is an itemized statement of the statutory or other fixed costs of a suit, filed by the successful party, with the judgment. The bill is usually "taxed," i.e., verified and allowed, by the clerk of the court in which the judgment was rendered, and its amount thereupon becomes a part of the judgment. The defeated party's objections to the bill must be presented in writing to the taxing authority whose finding is conclusive in the absence of such objection. See **COSTS**.

BILL OF CREDIT A letter of instructions issued by one person to another authorizing or directing the latter to pay a sum of money or to give credit for a certain amount to a third person named therein and promising to reimburse the person making the advance requested. Until acted upon, the letter is revocable. Payment of a sum of money in pursuance of the letter constitutes an acceptance of the writer's offer and renders him liable in contract to the extent of such payment. See **CONTRACT**, **LETTER OF CREDIT**.

BILL OF EXCEPTIONS In English and American law, the formal statement, for the purpose of a writ of error or appeal to a court having the proper jurisdiction by way of review, of the exceptions taken, or objections raised, to the rulings or decision of the trial court upon points of law. The object of a bill of exceptions is to bring the points complained of before the proper court for review and possible reversal or modification of the decision. See **APPEAL**, **ERROR**, **WRIT OF**.

BILL OF EXCHANGE An unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to, or to the order of, a specified person or to bearer. An inland or domestic bill is one which purports to be drawn and payable within a particular State. A foreign bill is one drawn in one State upon a person in another. For this purpose our States and Territories are deemed foreign to each other. While no set form of words is required to constitute a bill of exchange, an inland bill is ordinarily in the following form:

\$500

New York, March 4, 1914

Sixty days after date pay John Smith, or order, Five Hundred Dollars, value received, with interest, and charge to account of

JOHN JONES

To

JAMES LAMB, Albany, N. Y.

Foreign bills are often drawn in a set of three, numbered, respectively, first, second, and third

The following is a common form of the first of such a set

£100

New York, March 4, 1914

At sight of this first of Exchange (second and third unpaid) pay John Smith, or order, One Hundred Pounds, value received, with interest, and charge to account of

JOHN JONES

To

ARTHUR LAMB, London

Bills of exchange arose out of the commercial transactions of merchants engaged in foreign trade in the Middle Ages. They were used by the Florentines as early as the twelfth century, by the Venetians in the thirteenth, and were introduced into England during the latter part of the fourteenth century. However, they were long in securing general recognition in England, the first reported case in the courts of that country occurring in 1603. Originally, a bill of exchange was employed to avoid sending money from one country to another. If a London merchant, A, owed a debt in Amsterdam, he went to B in London, to whom money was owing from C in Amsterdam, paid to B the amount of the debt and received from him a bill of exchange on C directing him to pay that amount to A's creditor, D, in Amsterdam and charge the same to the drawer's account. By this means A's debt to D was discharged without sending any money out of the country. At this stage, therefore, a bill of exchange represented a trade transaction and was drawn by a creditor on his debtor. Such is still the character of a bill in France. In Great Britain and the United States, on the other hand, a bill of exchange need not represent a trade transaction, and is frequently issued as a mere instrument of credit. The person upon whom it is drawn (the drawee or acceptor), the drawer, or an indorser may put his name on the bill, not because he has received the value named therein, but simply for the accommodation of some other party, i.e., for the purpose of lending his credit to such accommodated party. In other words, bills of exchange have come to perform the functions of a paper currency.

The liability of the various parties to a bill may be stated briefly as follows: The drawee is under no legal obligation on a bill until he accepts it. An oral acceptance was held valid at common law, and this rule obtains in some of our States, but in others, and in Great Britain, under the statutes, acceptance must be in writing and signed by the drawee. This statutory requirement is satisfied by the drawee's signature across the face of the bill. By accepting the bill the drawee (hereafter called the acceptor) engages absolutely to pay it, and no demand need be made on him as a condition of suing him thereon. Nor will the fact that he received no consideration for accepting the bill be a defense against a holder for value, for the latter has been induced to give value for the bill by the acceptor's engagement to pay. It is a good defense, however, as against any one but a holder for value, or one claiming through such holder, the rule being that every negotiable instrument is presumed to have been issued, and every contract thereon, whether of acceptor, drawer, or indorser, made for a valuable consideration, but that this presumption may be rebutted in an action brought by any one who has not paid value for the bill or has not obtained title through a holder for value. The acceptance of a bill operates as a conclusive admis-

sion by the acceptor of the genuineness of the drawer's signature, of his capacity and authority to draw the bill, of the existence of the payee, and of his then capacity to indorse it, but it is not an admission that the body of the bill is genuine, nor that the indorsement of the payee is genuine.

The liability of the drawer and of indorsers is conditional, not absolute. The drawer admits the existence and capacity of the payee, and engages that the bill shall be accepted and paid by the drawee upon due presentment, and if it is dishonored and due proceedings thereon are taken, he will pay it to the holder or to any indorser who may be compelled to take it up. Every indorser engages that the instrument is a genuine, valid, and subsisting bill, to which he has a good title, that all prior parties were capable of contracting, that if accepted it shall be paid, or, if not accepted, that it shall be accepted and paid upon due presentment, and if it is dishonored and due proceedings thereon are taken, that he will pay it to the holder, or to any indorser subsequent to himself who may be compelled to take it up.

If a bill is presented for acceptance and acceptance is refused by the drawee, the holder, upon taking due proceedings of dishonor, has an immediate right of recourse against the drawer and indorsers and need not present the bill thereafter for payment. If the bill is accepted, then due presentment for payment must be made, in order to fix the liability of drawer and indorsers. For the various rules governing the time and manner of presentment of bills, and the proceedings of dishonor to be taken by the holder in order to secure his right of recourse against the drawer and indorsers, the reader is referred to law treatises on the subject, or to the Negotiable Instrument Law which has been enacted in about one-half of our States (This statute is Chap 612 of the Laws of New York, 1897.) The negotiability of a bill of exchange will be dealt with in the article on NEGOTIABLE INSTRUMENTS.

BILL OF HEALTH A certificate issued to the master of a vessel on clearing from a port, domestic or foreign, by the authorities of the port, describing the sanitary conditions there prevailing. When no disease of an infectious nature is known to exist in the port, the bill is known as a clean bill of health, if infectious disease is apprehended or suspected, it is called a suspected bill, and if such disease exists at the time of sailing, it is known as a foul bill. A vessel unprovided with a clean bill of health is liable to be quarantined at the port at which she arrives. It is the duty of a master to procure a bill of health before sailing and to deliver up the same to the superintendent of quarantine at the port of arrival.

BILL OF INDEMNITY In Great Britain and the United States a bill introduced into Parliament, the Congress, or a State legislature to legalize acts, usually of an official character, which, when they were performed, were illegal, or to exempt specified individuals or classes of persons from punishment for breaches of the law committed by them. When enacted into law, such a bill becomes an *Indemnity Act*. Acts of indemnity were, before the abolition of religious tests for holding municipal office in England, regularly passed by Parliament to relieve dissenters from the penalties incumbent by them for accepting office. They are still em-

ployed to relieve from liability officials who have exercised a doubtful authority under a suspension of the *habeas corpus* acts as well as to legalize official acts performed by a *de facto* officer whose right to exercise his office is doubtful or unfounded. See *DE FACTO, HABEAS CORPUS, INDEMNITY*.

BILL OF INDICTMENT In criminal law, the written finding of a grand jury as to the sufficiency or insufficiency of the charge laid before it as to the guilt of an accused person. If an indictment is found, indicating that, in the opinion of the grand jury, the evidence adduced shows that the accused should be put on trial for the offense charged in the indictment, the foreman of the jury indorses the words "a true bill" on the indictment, with his signature and the date of the finding. If, on the contrary, the evidence does not appear to justify putting the accused on trial, the foreman endorses the word "ignoramus" or, as is now more usual, the words "not a true bill" on the indictment with his signature and date as before. See *GRAND JURY, INDICTMENT*.

BILL OF LADING A written instrument issued by a common carrier, reciting that he has received certain goods, which he agrees to transport from one place to another and to deliver to a designated person or assigns, for such compensation and upon such conditions as are stated therein. Originally bills of lading were issued only by shipowners or carriers by water. Now they are employed by every class of carriers.

As a receipt, the instrument may be modified and even contradicted by oral evidence, so far as the immediate parties are concerned. If, however, a third party has bought and paid for the goods referred to in the bill of lading, relying upon the truth of its statements, the carrier is estopped (see *ESROPPEL*) from showing that those statements are incorrect.

While the contract was not assignable at common law, the indorsement of the bill of lading could operate to transfer the title to the goods represented. This symbolical character of a bill of lading originated in the fact that while a cargo is at sea it is incapable of physical delivery. Persons could sell and deliver goods during their transit only by treating bills of lading as symbols of the goods themselves. Hence the law merchant recognizes the delivery of a bill of lading as the legal equivalent of the delivery of the goods, and this rule of the law merchant was adopted by the common law. But bills of lading are not negotiable for all purposes. A shipper can give no title to the goods represented by a bill of lading by indorsing or transferring it, unless he is their owner, or has apparent authority from their owner. Nor can a finder or a thief of a bill of lading indorse in blank confer even upon a bona-fide purchaser a better title than he has. (See *NEGOTIABLE INSTRUMENTS*.) This seminegotiability of a bill of lading continues until a complete delivery of possession of the goods has been made to some person having a right to claim them under it.

Bills of lading are made, as a rule, in two or more parts—a practice which enables dishonest shippers to use them as instruments of fraud, by selling the various parts to different purchasers for value. In such a case the purchaser, to whom the transfer of one part is first made, becomes the owner of the property. Still, the carrier may safely deliver the property to

the one who first presents a part of the bill of lading if he has no notice or knowledge of a claim by the holder of another part, although the one so receiving delivery may be compelled to surrender the goods to other holders. In some States bills of lading have been declared by statute to be negotiable, like bills of exchange. But such legislation has not transformed, and cannot transform, documents of title to goods into fully negotiable instruments. Consult *Scrutton, Contract of Affreightment as Expressed in Charter Parties and Bills of Lading* (4th ed., London, 1899), and the authorities referred to under the title *CARRIER, COMMON*.

BILL OF MORTALITY A list, issued weekly, of births and deaths occurring within the limits of London, the publication of which began in 1592. Such bills are now superseded by the weekly bills prepared at the Registrar General's office.

BILL OF PAINS AND PENALTIES A bill introduced into the British Parliament, providing for the punishment of an offender without a trial in a court of law. The procedure in passing such bills is the same as that followed in ordinary legislation, and the act when passed has the effect of a judgment of conviction for crime in an ordinary tribunal. It differs from other penal legislation in that it is retroactive in its operation and may make that to be an offense against the state which was not so at the time of its commission, or impose a penalty which the offense did not involve when committed. Strictly speaking, the bill of pains and penalties comprehends the bill of attainder, but, as commonly employed, the former is limited to cases in which any penalty less than death is imposed by the statute, whereas the bill of attainder always imposes the penalty of death. This method of punishment was resorted to for political offenses, or in cases where the penalties of the ordinary criminal law were deemed inadequate, or where the offense committed was not defined by the law of the land, or where the courts were, by reason of bias, deemed incompetent to deal with it. It was generally employed in cases of treason or other high crimes and misdemeanors, but sometimes also for lesser offenses. Punishment by act of Parliament has long since fallen into disuse, the last instance of its employment being in the case of Queen Caroline in 1820.

The exercise of such despotic legislative power having been found to result in gross injustice under stress of violent political excitement, or by reason of the inquiry of oppressive rulers, bills of pains and penalties were prohibited by the clause of the Constitution of the United States forbidding Congress and the several States from passing bills of attainder or ex post facto laws (Art. I, Sec. 9), so that no act may be made criminal after its commission, nor may the punishment prescribed therefore be increased. See *ATTAINDER, BILL OF ATTAINDER, TREASON*.

BILL OF PARTICULARS In American legal practice, a written statement of the items of the demand upon which the plaintiff in a suit founds his action or the defendant his set-off or counterclaim. In some jurisdictions it must be filed with the pleading of the party, in others, only on request of the opposite party, or in response to an order of the court. The requiring of a bill is largely in the discretion of the court. It is generally conclusive on the party furnishing it. A failure to file a bill of particulars

when required by law precludes the party in default from giving any evidence in support of his claim on the trial. Consult the authorities referred to under the title *PRACTICE*.

BILL OF PEACE A complaint in equity to restrain repeated attempts to litigate the same cause of action by suits at common law. The objects of the proceeding are to suppress useless and oppressive litigation and to prevent a multiplicity of suits, and this procedure may accordingly be resorted to (a) where a numerous class of persons insist upon the same legal right arising out of the same transaction, and (b) where the same individual persists in renewing repeatedly an unsuccessful action. The remedy is by injunction forbidding the prosecution of the vexatious suits. See *BILL, CHANCERY, EQUITY, QUIA TIMET*.

BILL OF RIGHTS An act of Parliament passed in 1689, immediately after the accession of William and Mary, and embodying the fundamental principle of political liberty as understood in England. It condemns as unconstitutional certain abuses of the royal power that had characterized the reign of the preceding sovereign, James II.—the suspension of acts of Parliament by royal prerogative, the levying of taxes without consent of Parliament, the maintenance of a standing army in time of peace, interference with the administration of justice and free elections, the infliction of unusual punishments, the exaction of excessive bail, and the denial of the right of petition. It then affirms the freedom of debate in Parliament, the freedom of elections, and the freedom of petition. In France bills of rights were frequently enacted after the Revolution of 1789. The name is commonly given to the first ten amendments to the Constitution of the United States, proposed in the first Congress that met after the adoption of the Constitution itself and ratified by the necessary number of States in December, 1791. They appear to have been added in order to satisfy the objection made by many that the Constitution itself was not sufficiently specific in defining the rights of the citizen. See *RIGHTS, DECLARATION AND BILL OF*.

BILL OF SALE A formal written conveyance, generally, but not necessarily, under seal, of a right to or interest in personal property. It should contain a description of the parties and property sufficient for identification, and on delivery it effects transfer of title from vendor to vendee. A bill of sale is the instrument used commonly in the sale of household furniture, the stock, fixtures, and good will of a business, and especially in the transfer of ownership of ships, which, if the ships be registered, must, under both the English and United States laws, be made by bill of sale (English Merchant Shipping Act, 1854, Sec. 55, U. S. Rev. Stats., Sec. 4170). If the property is delivered when sold or a part of the purchase money is paid, a bill of sale is unnecessary to make a valid transfer, but is a convenient evidence of title. The instrument alone is insufficient without delivery of the property to protect the purchaser against the creditors of the seller, though under the registration laws of the United States this protection may generally be secured without transfer of possession by filing or recording the bill of sale. It may also be employed, in place of the actual physical delivery of a chattel, to effect a gift thereof. Bills of sale may be absolute or conditional. The latter operate as

security and are generally considered chattel mortgages (q.v.) in American law. See SALE.

BILL OF SIGHT A document signed by or on behalf of an importer of goods in England, who does not possess a sufficiently accurate knowledge of their quantity or quality to enable him to make a perfect entry of them. In this document the importer gives the best description of the goods that is practicable. It is then presented to the collector of customs, who is authorized, upon its receipt, to have the goods landed and examined by the importer in the presence of customs officers, after which the importer must make a perfect entry within a limited period, or the goods are sold to pay duties and charges. Somewhat analogous provisions for expediting the delivery of parcels and packages are contained in Secs 2855-2858, 2990-2997, and Chap 371 of Laws of 1896 (29 United States Statutes at Large, 263).

BILLON, be'yón' (Fr. copper coin, base coin, OF *bilion*, mass, of bullion) An alloy of silver with copper, in which the copper predominates. Billon was formerly much used in Germany and in Austria for coins of smaller denominations, in order to avoid the bulkiness of copper.

BILLOT, be'yó', JEAN BAPTISTE (1828-1907) A French general, born at Chaumeil (Correze). He was admitted to the military academy at Saint-Cyr in 1847, was advanced to the rank of lieutenant in 1852, captain in 1854, lieutenant colonel in 1869, and colonel in 1870. After a period of service in Mexico and Algeria he was appointed to the command of a division of the Second Army Corps (l'Armée du Rhin) upon the outbreak of the Franco-Prussian War and participated in the battle of Spichern and in the defense of Metz. Afterward he became commander of the Eighteenth Army Corps and rendered distinguished services at Baune la Rolande and Villersexel, where the French army gained one of the few victories of the war. He was Minister of War in the cabinets of Freycinet (1882-83) and Méline (1896-98).

BILLROTH, bil'ró't, THEODOR (1829-94) A German surgeon. He was born at Bergen, on the island of Rugen, and studied medicine at the universities of Griefswald, Göttingen, Berlin, and Vienna. He was the assistant of Langenbeck at Berlin and was appointed professor of surgery at the universities of Zurich (1859) and Vienna (1867). Billroth was one of the greatest operators of modern times and one of the foremost promoters of histology, pathology, and military surgery. His publications include the following valuable contributions to medical literature: *Die allgemeine chirurgische Pathologie und Therapie* (translated into nearly all the principal languages of Europe, as also into the Japanese, 1863, 16th ed., 1906), *Chirurgische Briefe aus den Kriegslazareten in Weissenburg und Mannheim* (1872), *Ueber den Transport der im Felde Verwundeten und Kranken* (with Mundy, 1874), *Die Krankenpflege im Haus und im Hospital* (6th ed., 1900, Eng. trans., *The Care of the Sick at Home and in the Hospital*). Billroth was a skillful amateur musician, and after his death there was published his *Wer ist Musikisch?* (3d ed., 1898).

BILNEY, bil'ní, or **BYLNEY**, THOMAS (1495-1531) An English martyr, born probably at Norwich, studied at Trinity Hall, Cambridge, and in 1519 ordained priest. After a study of Erasmus' Latin *New Testament* (1516), he denounced the scholastic doctrine of "good

works," as well as saint and relic worship, and pilgrimages to Walsingham and Canterbury. He was arraigned before Cardinal Wolsey in 1527 and, having recanted, was absolved, but confined in the Tower until 1529. In 1531 he began field preaching in Norfolk, but was soon arraigned, condemned as a heretic, and burned at London.

BILOXI, bi-lók'sí A city in Harrison Co., Miss., 60 miles southwest of Mobile, Ala., on a peninsula formed by Back Bay of Biloxi and the Gulf of Mexico, and on the Louisville and Nashville Railroad (Map Mississippi, H 10). A popular summer and winter resort, it has a beach 6 miles long, shell and brick paved streets, and beautiful surroundings. The city has a fine government building, several hotels and beautiful residences, a country club, and a sanitarium. Biloxi is the centre of an extensive canning industry (oysters, shrimp, crabs, fruits, and vegetables), has shipyards and ice factories, and manufactures lumber. The water works are owned by the municipality. In 1699 Iberville (q.v.) established a settlement at a point across the bay from the present city and named it Biloxi, from the Biloxi Indians. He also built a fort near by (Fort Maurepas), which was the first French post in this part of the country. In 1701 the settlement (now known as Old Biloxi) was abandoned because of a destructive fire, and about 1712 a permanent settlement, the first within the present limits of Mississippi, was made here. For several years in the early part of the eighteenth century Biloxi was the capital of the French territory in this part of North America. It was incorporated as a town in 1872 and as a city in 1896, the date of the charter now in force, which provides for a mayor, elected every two years, and a city council. Pop., 1900, 5487, 1910, 8049. For the history of Old Biloxi (1699-1701), consult French, *Historical Collections of Louisiana* (New York, 1846-50).

BILOXI A small tribe of Indians, originally residing about Biloxi Bay, on the Gulf coast of Mississippi, whence they removed to Louisiana, probably early in the eighteenth century. From their geographic position and alliances it was long assumed that they were related to the Choctaws, but in 1886 Gatschet discovered a few families in Louisiana still speaking their language and demonstrated that it is a detached dialect of the great Siouan stock. Consult J. R. Swanton, *Bulletin 43, Bureau of American Ethnology*, Dorsey and Swanton, *Dictionary of the Biloxi Language* (Washington, 1912).

BILSA. See **BHILSA**.

BILSTON, bil'stón A town of Staffordshire, England, situated on rising ground, 2½ miles southeast of Wolverhampton (Map England, D 4). It forms a part of the parliamentary borough of Wolverhampton, and has extensive iron and coal mines, iron-smelting works, iron foundries, manufactures of tin-plate goods, japanned and enameled wares, nails, wire, screws, and coarse pottery. Fine sand, adapted for metal casting, is found here. The municipality owns and operates its water works and maintains public baths and parks. Pop., 1891, about 23,500, 1901, 24,000, 1911, 25,681.

BIMA, bé'ma See **BRIMA**.

BIMBASHI See **BASHI**.

BIMBISARA A King of Magadha, the modern Bihar, one of the earliest friends and protectors of the Buddha, whom he presented with the famous pleasure park, *Vesuvana*. Bim-

bisāra resigned in the sixth century B C for 52 years, and he was murdered by his son, Ajatasatru. According to other accounts, however, Bimbisāra reigned only 28 years.

BIMELER, J M See BAUMELER, JOSEPH MICHAEL.

BIMETALLISM (Lat *bis*, twice + *metallum*, metal) The name given to a monetary system in which both gold and silver stand upon precisely the same footing as regards mintage and legal tender. The practical difficulties which in times past have confronted the maintenance of a concurrent circulation of the two metals have led one nation after another to abandon the effort, and to adopt a system of monometallism, with gold as its basis. The historical development of coinage in modern nations has been from silver monometallism through a more or less unsatisfactory experience with bimetalism to the single gold standard.

The English monetary notation with the pound as the unit recalls the origin of English money, with a pound of silver as its basis. By successive debasements the coinage of the monetary pound parted company with the pound weight, until in the time of Elizabeth the pound weight of silver was coined into 62s instead of 20s. Gold coinage had been introduced by Edward III, but a long course of experimentation, often of a most arbitrary nature, both with the silver coinage and the gold coinage, had failed to accomplish any satisfactory adjustment of their mutual relations. During this whole period silver was in theory the standard coin of the realm and was so considered when William III in 1699 completed the recoinage of the silver coin. His government fixed the value of the guinea at 21s 6d, but, as this overrated gold, the silver coinage, in excellent condition from its recent passage through the mint, was rapidly exported, and the loss of the small change caused great inconvenience among the people. On the advice of Sir Isaac Newton, then master of the mint, the guinea was in 1717 declared to be equal in value to 21s. This mitigated the evil, but did not remove it. Silver could be freely minted as before, but since its market value was higher than its legal value, it was not carried to the mint. For all larger payments gold became the exclusive medium of exchange, for there was scarcely enough silver to meet the needs of retail trade. During the course of the century the stock of silver coin was not replenished, and the money in circulation became extremely abraded. This depreciation of the coin led in 1774 to the law that in sums of £25 and upward silver should be legal tender by weight only, and not by tale. By the coinage law of 1816 silver was reduced to a place of a token coinage. By that law 60s were to be coined from the pound weight of silver, though the mint price paid to individuals remained, as before, 62s for the pound. This threw the coinage of silver in fact upon the government, and by the coinage act of 1870 the right of individuals to take silver to the mint for coinage was abolished. By these successive steps England legalized the single gold standard, which had in fact been in operation since 1699 at least.

Other nations were slow to follow this example. By the monetary law of 1801 France contemplated the 5-franc silver piece as the standard money, but in fact established a bimetallic system. In the first half of the century silver

remained the usual currency of the country, but after the discovery of gold in California and Australia and the fall in the price of gold relatively to silver, the French law favored the coinage of gold. Silver disappeared from circulation, and the lack of small change led in 1800 to the reduction of the smaller silver coins to tokens by increasing the percentage of alloy. Similar but not uniform action by contiguous countries which used the same coin, and were accustomed to regard all francs as identical, irrespective of the heads upon the coins, led to much inconvenience, and finally, in 1865, the Latin Monetary Union was formed to secure a common basis of coinage among such countries. The 5-franc piece, then little coined, was not disturbed, but the subsequent fall in the price of silver led to such excessive and unequal coinage by the several States composing the Union that agreements were entered into restricting, and finally abolishing, in 1877, the further coinage of the 5-franc piece. By this action France, Belgium, Switzerland, Italy, and Greece were added to the ranks of the gold-standard nations. Germany, which had been exclusively upon a silver basis until 1871, in that year adopted the gold standard as one of the elements of the unification of the coinage following the establishment of the Empire. Indeed, her action in throwing her stock of silver in the following years upon a market which was already falling is deemed to have been an important factor in leading the Latin Union States to abandon silver. The Scandinavian countries and Holland followed the example of their neighbors in the seventies, while Russia and Austria, then in the toils of a paper currency, were unable to take such action until the close of the century.

The United States until the outbreak of the Civil War had been legally upon a bimetallic basis. As in France, the outflow of silver following the gold discoveries of the middle of the century had led to laws making the silver fractional coins tokens of limited legal tender. In the revision of the coinage laws in 1873, when we were yet upon a paper basis, the silver dollar was dropped from the coinage, and gold became the nominal standard. With the return to a metallic currency, a reaction in favor of silver set in. Various unsuccessful attempts were made to reestablish the free coinage of the silver dollar. The strength of the silver advocates was sufficient to bring about a series of compromise measures which, without removing all restrictions upon the coinage of silver, materially increased the volume of silver in the circulation of the country and at times threatened the maintenance of the gold standard. The law of 1878 provided for the purchase of not less than two million dollars' worth of silver monthly nor more than four million dollars' worth, and the coinage of the bullion thus purchased into silver dollars of 412½ grains standard silver nine-tenths fine. Under this law nothing more than the minimum amount was purchased and coined. In some respects the law of 1890 went further in providing that the Secretary of the Treasury should purchase monthly 4,500,000 ounces of silver bullion and issue Treasury notes for the purchase price of the same. Both the silver dollars and the Treasury notes of 1890 enjoyed the full legal-tender quality. The policy of purchasing silver was abandoned in 1893. In 1896 the presidential election hinged upon the declaration of the Democratic platform in favor of the free coinage of sil-

ver by the United States in the ratio of 16 to 1. The defeat of the Democratic candidate and the subsequent adoption of the currency law of 1900 still further strengthened the gold standard legislation of the nation. These, with the cessation of silver coinage in India, and the adoption of the gold standard by Japan, and the introduction of a theoretical gold standard in Mexico in 1905, the establishment in 1906 by Brazil of a conversion fund by which the gold standard was rendered effective, are in brief the salient features of the history of the standards among modern nations. For a more detailed account, see *LATIN UNION, MONETARY COMMISSION, MONETARY CONFERENCES, MONEY*.

The arguments advanced by the advocates of the opposing systems may now be passed in review. In the first place, it should be stated that in its modern form the question of bimetalism is one of standards and not of circulation. If in earlier days the problem was to secure the concurrent circulation of gold and silver coin to meet the needs of wholesale and of retail trade, this aspect of the question is no longer important, for means have been found to insure this result without a resort to bimetalism. Almost equally irrelevant is the objection often heard to the use of silver as standard money because of its bulk and weight. This is an objection perfectly well founded, to be sure, against the circulation of silver coin, but not against silver as standard money. For silver money may and does circulate through its paper representatives, as the notes of the Bank of France or the silver certificates of the United States amply testify. In the same line of argument the contention that bimetalism exists everywhere in fact, because, whenever gold is used, silver must also be used in the monetary circulation, has no bearing upon the controversy. Only the most inexperienced in monetary affairs would attach the name "bimetalism" to the circulation of the two metals side by side, irrespective of the laws which govern their coinage. For it is the essence of bimetalism, as appears in our definition, not simply that both metals should be coined, but that both should be coined on precisely the same legal footing and possess the same legal-tender qualities. They may circulate together, yet stand upon a wholly different basis. Thus, in the United States, the subsidiary silver coins are limited both in amount and in legal tender, while the silver dollars, though unlimited in legal tender, are limited in amount. Both stand obviously upon a wholly different footing from gold, which not only possesses unlimited legal tender, but which can be coined at the instance of individuals without restriction of amount. It is that element in the metallic currency which is freely expansible by law which gives the standard.

The advocates of bimetalism have laid stress upon two results which they say would follow the adoption of their system. (1) the regulation of exchanges between the various nations, (2) the attainment of a more stable standard of value. They point out that the use by some nations of gold and by others of silver as the monetary standard produces a fluctuating par of exchange between gold and silver nations which impedes commerce and causes great uncertainty in their mutual relations. To the extent that uncertainty prevails as to the return when the prices attained in one country are translated into the standard of the country which has sold the goods, to that extent is trade rendered difficult

The liability to loss through exchange enhances the prices of goods sold. It is further pointed out that the varying tendencies of prices under one standard, as compared with another, act as an unnatural impediment or stimulus to trade. If gold prices and the gold price of silver fall alike, silver using nations may export to gold countries without any loss, while gold countries find prices falling. Thus, if wheat falls in price in England, exporters in India suffer nothing, while exporters in the United States must be content with lower prices. A fall in the gold price of silver accompanies a fall in the prices of other commodities in gold countries, but the relation of silver to commodities remains the same, and no enhancement of general prices ensues in silver-using countries.

A more important tenet of the bimetallic creed is that such a system produces a more stable standard of value. The evils of instability in the monetary standard are thoroughly conceded by all parties. As illustrated in the fluctuating fortunes of paper money, they are patent to all. Under a metallic system, changes in the value of the standard are more gradual and less revolutionary in their effects. Yet they exist, none the less, and reveal themselves in the ups and downs of general price movements. It is only after some study that persons understand that prices and the value of the standard are reciprocals, that low prices mean a high value of money and high prices a low value of money. The economic effects of changes in the value of money must be studied in the effects of price changes. Downward movements representing an enhanced purchasing power of money redound to the benefit of creditors and bear heavily upon debtors, who require a larger produce to fulfill their obligations. Upward movements lighten the burden of the debtor, while they shrink the purchasing power of what the creditor receives and thus work to his injury. Such changes are not without profound effects upon the general conditions of trade and industry. Bimetalism proposes to eliminate in a large measure these evils, furnishing a more stable standard. Instability of the standard rests upon the fluctuations in the production of the metals. It is argued that by uniting in the monetary standard two metals instead of one, the fluctuation in the production will be diminished. The aggregate product is less likely to vary than is the product of either, the changes in the production of the one being offset by changes in the production of the other.

In reply to these claims and assertions, the gold monometallists have taken several positions. In the first place, some have contended that the evils which bimetalists seek to redress are of no great consequence. In the second place, others have contended that as a plan of relief bimetalism is out of the question because it will not work in practice. And finally, granting the possibility of bimetalism, it is claimed that we have no guarantee that it would actually relieve the situation.

It is an extreme view that the changes in prices, which constitute the chief stay of the bimetallic argument, have no relation to the money supply. If this, however, be true, a system which, like bimetalism, aims at working upon prices through the money supply is useless. If this extreme view has not been adopted by all monometallists, it is yet represented. Another and somewhat more moderate view of the same proposition is the claim that such changes in

prices have worked far less disturbance than the bimetallics have claimed, and that, if they involve some disadvantages, they have some compensations which the bimetallicist in his ardor has overlooked.

More important, and occupying a larger place in the bimetallic controversy, is the standpoint that bimetallicism will not work, that no legal enactment can so fix the relative values of silver and gold as to insure their concurrent circulation. In this view bimetallicism is not a double standard, but an alternating standard. Divergences between the legal ratio and the market ratio being bound to occur, Gresham's Law immediately enters into operation. The more valuable metal is no longer brought to the mint, and the existing stock in the circulation is exported. Monometallicists claim this to be inevitable. They tell us that law cannot fix values, that the relative value of gold and silver in the market will be fixed by commercial considerations, especially by the cost of production. Any attempt on the part of governments to interfere with the operation of these laws must be fruitless. To these considerations the bimetallicist replies by calling attention to the predominating influence of demand as a factor affecting the value of the precious metals. He points out that as the existing stock is much greater than the annual accretions, the cost of producing these cannot be the sole criterion of the value of the mass. He points out further that the demand for the use of the metals as money far outstrips any other demand. He therefore concludes that law can and does affect the value of the metals and is competent to fix the rates between them, that if the monetary demand thus created be strong enough, the commercial ratio must adjust itself to the legal ratio. Both sides of the controversy appeal to the facts of history as bearing out their contentions. On the one hand, the monometallicist points to the fact that the French law of 1801 which established the legal ratio of $15\frac{1}{2}$ to 1 between gold and silver did not control the market ratio, but there was always a divergence between them, leading now to a preference for gold and now to a preference for silver in the French coinage. The bimetallicists concede that such divergence might have prevented both silver and gold being carried to the mint at the same time, that they might have determined which of the metals would be preferred for export, but they strenuously deny that they caused the export of one metal or the other. If the French law gave but an imperfect picture of the workings of the bimetallic system, it is only a proof to the advocates of the latter that the area within which it worked was too restricted. Enlarge the scope of the law by an international agreement embracing the leading commercial nations, and it would, they claim, be proof against fluctuations of ratio. Hence the agitation for a bimetallic standard has been for an international bimetallic system.

Finally, the monometallicists are frequently willing, for argument's sake, to concede the practicability of bimetallicism, that they may put the further question, What would be gained? The evil to be remedied is an unstable standard. What guarantee have we that two metals would be better than one? The bimetallicists claim a compensatory action, that irregularities in the supply of one metal will balance those of the other. They assert that a greater stability would follow the introduction of their system from the

fact that by distributing the variation over a wider area the full supply of both metals offering a much more extensive surface, the effect would be far less perceptible. "Imagine," says Professor Jevons, "two reservoirs of water, each subject to independent variations of supply and demand. In the absence of any connecting pipe the level of the water in each reservoir will be subject to its own fluctuations only. But if we open a connection, the water in both will assume a certain mean level, and the effects of any excessive supply will be distributed over the whole area of both reservoirs." They point to the experiences following the discovery of gold in the middle of the century as proof. In 1840 gold was produced to the extent of \$30,000,000 and silver to that of \$32,500,000. In 1852 the figures were, for gold \$150,000,000, and for silver \$42,500,000. In other words, gold was advanced fivefold, but the combined product of gold and silver only threefold. This moderated the effect of the gold discoveries upon prices. The monometallicists contest this theory and deny that it rests on a sufficient basis of historical fact. They hold that there are no inherent reasons why the combined production of gold and silver should not under a bimetallic system fluctuate quite as much as the production of gold alone.

We have endeavored to state the case between the two parties as one of pure theory. In so doing we fail to give any adequate idea of the heat of the controversy and the passions which it has aroused. To understand properly the ardor of the struggle, a brief reference to the historical setting of the discussion is perhaps desirable. The great bulk of the theoretical and controversial literature upon the subject appeared in the period between 1873 and 1898. This was a period of steadily falling prices—a period, upon the whole, of commercial depression. Trade languished, and the burden of debt grew heavier. The gold product was growing less each year, yet the general adoption of the gold standard with increased population, and a growing economy in the use of money made a constantly increasing pressure upon the gold supply. Bimetallicism seemed to promise a relief from the deadening effects of falling prices, and the industrial world lent a ready ear to its plans. It was not so much a conviction that bimetallicism represented a superior monetary system as a deep-seated feeling that the adoption of the gold standard and the attendant price changes had wrought serious social injury that won for bimetallicism so wide a following. With the upward trend of prices following the great increase in the output of gold (qv) the bimetallic movement was sapped of all vitality.

The literature of bimetallicism is extensive. An exhaustive bibliography on the money question was issued in 1878 as an appendix to the *American Report of the International Monetary Conference* (Consult Horton, *The Monetary Situation*, Cincinnati, 1878.) Since that time the output has been enormous. The bimetallic theory claims the authority of Wolowski and Cairnes in France, Malou and de Laveleye in Belgium, Mees, Violik, Van den Berg, and Boisserman in Holland, Seyd, Nicholson, and Foxwell in England; Arendt in Germany, Haupt in Austria, Horton, F. A. Walker, and Andrews in the United States. On the side of the single standard are many of the older English economists—Locke, Petty, Harris, later Lord Liverpool, Tooke, Ricardo, and J. S. Mill, and, more re-

cently, Giffen—and among American writers, Wells and Laughlin. For a clear notion of the controversy, consult Walker, *International Bi-metallicism* (New York, 1896) and Giffen, *Case against Bi-metallicism* (London, 1896). Other works to be commended are Nicholson, *Money and Monetary Problems* (London, 1897), Horton, *The Silver Pound* (London, 1887), Walker, *Money* (New York, 1878) and *Money, Trade and Industry* (New York, 1879), Andrews, *An Honest Dollar* (Hartford, 1894), *Report of the Monetary Commission of the Indianapolis Convention* (Chicago, 1898), Helm, *The Joint Standard* (London, 1894), Taussig, *The Silver Situation in the United States* (New York, 1893), White, *Money and Banking* (Boston, 1896), Laughlin, *History of Bi-metallicism in the United States* (New York, 1897), Price, *Money and its Relations to Prices* (London and New York, 1896).

In official literature, the *Report of the United States Monetary Commission* (1870), the *Reports of the Monetary Conferences* (1878, 1881, and 1892), the *Reports of the Royal Commission on the Depression of Trade* (1883) and on the *Relation of Gold and Silver* (1886), the *Report of the Indian Currency Commission* (1893) and of the *Berlin Silver Commission* (1894) are important.

BINALONAN, be'na-lō'nan A town of Luzon, Philippines, in the province of Pangasinan, 27 miles east of Lingayen (Map Luzon, D 2). It is situated in a densely wooded territory and is the junction of several important highroads. Pop, 1903, 14,603.

BINANG, be'nyan, or **BINAN** The largest town of the province of Laguna, Luzon, Philippines, 19 miles by highway from Manila (Map Luzon, F 9). It is situated on the west shore of Laguna Bay. Pop, 1903, 19,786.

BINARY SYSTEM See DOUBLE STARS

BIN-BIR-KILISSEH, ben'ber-ke'la-sā' (Turk bin, thousand, bir, one, kilisseh, church, from Gk ἐκκλησία, ekklesiā). The name of extensive ruins in Karamania, Asia Minor, 20 miles north-northwest of the town of Karaman. The ruins consist chiefly of the remains of early Byzantine churches, of which four or five are in fair preservation and over 30 are in ruins. Bin-Bir-Kilisseh is supposed to be the ancient Debe, though Hamilton identifies it with Lystra.

BINCHE, binsh A town in the province of Hainaut, Belgium, on the Haine, 10 miles east-southeast of Mons (Map Belgium, C 4). It is well built and walled, manufactures leather, cutlery, pottery, glass, etc., and carries on a considerable trade in paper, marble, coal, and lace, which is shipped principally to Brussels. Formerly the revenue of Binche was the marriage portion of the eldest daughter of the Count of Hainaut. Pop, 1890, 10,100, 1900, 11,500, 1910, 11,690.

BINCHOIS, bin'shwa', GILES (c 1400-60). One of the principal masters of the Gallo-Belge school of composition. He was born at Bins in Hainaut and at first followed the profession of arms. Later he was a singer in the chapel of Philip the Good of Burgundy. He died at Lille. Until quite recently only a few fragments of his masses were known. But the discovery of some manuscripts containing 52 secular songs in rondeau form with instrumental accompaniment threw new light on the condition of music at that time.

BINDING, bin'ding, KARL (1841-) A

German criminologist and jurist, born in Frankfurt-on-the-Main. He studied at the universities of Göttingen and Heidelberg and in 1873 became professor of criminal law in Leipzig, and rector of the university (1908-09). Of his works on jurisprudence, *Die Normen und ihre Uebersetzung* (1872-77), in which he attempted a thorough revision of accepted theories respecting criminal law, is especially important. But one volume (1898) appeared of his *Das Burgundisch-Romanische Königreich*. In 1885 he established the *Systematisches Handbuch der deutschen Rechtswissenschaft*. Among his other publications may be mentioned *Die rechtliche Stellung des Kaisers im heutigen deutschen Reiche* (1898), *Grundriss des deutschen Strafrechts* (1890, 5th ed, 1905), *Lehrbuch des gemeinen deutschen Strafrechts* (3 vols, 1902-05).

BINDRABAN, bin'dra-bān' (Skr Vrnda-vana, a grove consecrated to Krishna or Vishnu), or **BRINDABAN** A town on the Jumna, in the district of Muttra, United Provinces of Agra and Oudh, British India, situated 92 miles south of Delhi (Map India, C 3). Pop, 1901, 22,717, 1911, 18,443. It is one of the sacred Hindu cities, and crowds of pilgrims come from all parts chiefly to do honor to Krishna. It has several superb temples and shrines, and, through the munificence of wealthy devotees, these are becoming more numerous and costly. Here, as at Benares, the immediate margin of the river is occupied by flights of steps, or ghats, extending for about a mile along the bank.

BINDWEED See CONVULVULUS

BINET, bē'nā', ALFRED (1857-1911). A French psychologist, director of the laboratory of physiological psychology at the Sorbonne, Paris. He was born in Nice, July 8, 1857. He went to Paris in 1871 and, having studied law and medicine, turned his attention in 1880 to experimental and pathological psychology. He contributed many articles to the *Revue philosophique*, the *Revue scientifique*, and *Mind*. His first book was *La psychologie du raisonnement, Recherches expérimentales par l'hypnotisme* (1886, Eng trans, 1899), in which he undertook to apply the method of hypnotism to psychological questions. Other works are *Perception intérieure* (1887), *Études de psychologie expérimentale* (1888), comprising a section upon sexual psychology (fetichism in love), one upon the physical life of microorganisms (trans, 1897), and a third upon mental imagery, *Les altérations de la personnalité* (1892, Eng trans, 1896), *Introduction à la psychologie expérimentale*, in connection with Philippe, Courtier, and V. Henri (1894), *On Double Consciousness* (1896), *La fatigue intellectuelle*, with the collaboration of Henri (1898). His later works include *La Suggestibilité* (1900), *Étude expérimentale de l'intelligence* (1903), *L'âme et le corps* (1905), *Les révélations de l'écriture d'après un contrôle scientifique* (1906), *Les enfants anormaux*, with Simon (1907), *Les idées sur les enfants* (1900). From 1895 Binet also, together with H. Beaunis and Th. Ribot, edited *L'année psychologique*, a yearly volume comprising original articles, a review of the progress of psychology, and (for some years) an index of all publications which bear upon that science.

The pages of his journal had always been open to problems in "applied psychology," and in 1908 he formally devoted the *Année* to the

study of practical and social questions. To posterity he will doubtless be best known for his contributions to this field, in particular, for his attempts to find some standard by which degrees of intelligence might be measured. To this end he published, with Th. Simon, the *Binet-Simon Tests* (first series 1905, second series 1908). (See *MENTAL TESTS*.) As a man of science he had a large measure of originality and true psychological insight, and he will take rank with the leading psychologists of his generation. Consult Simon, "Alfred Binet," *Année psychologique*, vol. XVIII (Paris, 1912).

BINET, SATANÉ A pen name of Francisque Sarcey.

BINET TEST See *MENTAL TESTS*.

BINGEN, bing'en (anciently, *Bingum* or *Vincum*, capital of a Gallic tribe). A town in the Grand Duchy of Hesse, Germany, 17 miles west of Mainz on the left bank of the Rhine, at the mouth of the Nahe, and opposite Ruedenheim (Map Germany, B 4). It is the seat of the Rhenish Technical College and a number of other educational institutions. The Gothic Parish Church dates from the fifteenth century and contains a crypt of the eleventh century. Near by, on the Rothenberg, are the ruins of the castle of Klopp on the site of an old Roman fortress, and a short distance higher is the chapel of St. Roch, to which pilgrimages are made by thousands of people annually. On the other side of the Nahe is the Rupertsberg, with the ruins of a monastery in which St. Hildegard resided in the twelfth century. A short distance below the town, on the Rhine, is the celebrated Binger Loch, formerly a dangerous point in the navigation of the Rhine, but since 1834 rendered safe through the deepening of the channel. The magnificent Niederwald Denkmal, to commemorate the victories of 1870 and 1871, rises high on the opposite side of the river, and in the middle, on a rock, stands the Mouse Tower, in which according to legend Archbishop Hatto was devoured by mice in the year 909. The mediæval stone Drusus Bridge, whose foundations date back to the Roman occupation, crosses the Nahe near its mouth. Bingen's principal industries include the manufacture of starch, tobacco, leather, and liquors, and a trade in grain, cattle, coal, iron, and wine. Pop., 1895, 8187; 1905, 9950. Bingen was a town of the ancient Belgæ, and in 70 A.D. was the scene of the battle of Bingenum, in which the Romans defeated the rebellious Gauls. Drusus built a castle there and threw a bridge across the Rhine, in 13 B.C. In 1281 it came under the rule of the Archbishop of Mainz. It was repeatedly captured during the Thirty Years' War, and in 1689 the French burned the town and blew up the castle. The town belonged to France from 1797 to 1814 and in 1815 became a part of Hesse.

BINGER, bin'zhâ, LOUIS GUSTAVE (1856-) A French African explorer, born at Strassburg. In 1887 he started from Bamaku, explored Sikasso, and then turned to Kong, which he was the first European to explore. After disproving the hitherto accepted theory that there were mountains in that region, he visited Baramo and Wagadugu (1888) and in 1889 reached Grand Bassam. By treaties he succeeded in placing Tchia, Kong, and Boutuku under a French protectorate and thus laid the foundation of a French Sudanese Empire. He returned to West Africa in 1892, as French com-

missioner for the settlement of the Ashanti boundaries with England, and after serving as Governor of the French territory on the Ivory Coast from 1893 to 1896, was director of the French colonial department from 1896 to 1903. His chief publications are *Du Niger au golfe de Guinée, par le pays de Kong et de Mossi* (1891), *Declatage, Islamisme, et Christianisme* (1895), *Le serment de l'explorateur* (1905), *Le pèril de l'Islam* (1906), *Héros d'Alsace* (1907).

BINGHAM. A town in Salt Lake Co., Utah, 20 miles southwest of Salt Lake City, on the Denver and Rio Grande and the Bingham and Garfield railroads (Map Utah, B 2). The town has extensive copper mines and contains a hospital. Pop., 1910, 2881.

BINGHAM, AMELIA (1860-) An American actress, born at Hicksville, Ohio, her parents' name being Smiley. She married Lloyd M. Bingham, after studying at Ohio Wesleyan University. Her professional debut was made at the People's Theatre, New York, in *The Power of Gold*, and subsequently she played in several melodramas. After one year with Augustus Pitou and five years with Charles Frohman, she was leading lady at the New York Empire Theatre in *His Excellency the Governor*, and other plays. In 1901 she formed her own company, which produced *The Climbers*, *A Modern Magdalen*, *The Frisky Mrs. Johnson*, etc. In 1913-14, in a company including William H. Crane, she played in *The New Henrietta* (a revision of *The Henrietta*, by Bronson Howard), taking the part of Mrs. Opdyke.

BINGHAM, HIRAM (1875-) An American explorer and educator, born at Honolulu, Hawaii. He graduated from Yale University in 1898 and received a Ph.D. from Harvard in 1905. For several years he taught history and related subjects at Harvard and Princeton. In 1906 he began a series of explorations in South America, first following Bolívar's route across Venezuela and Colombia, then (in 1908-09) exploring the Spanish trade route from Buenos Aires to Lima, Peru. At this time and in subsequent investigations (especially in 1912-13) he made important archaeological discoveries relating to prehistoric and Inca remains. He was appointed lecturer at Yale on Latin-American history (1908), lectured in 1910 at Johns Hopkins on diplomatic history, and became curator of South American history at Harvard and at Yale. Besides numerous papers contributed to magazines and reviews, his writings include *Journal of an Expedition across Venezuela* (1909), *Across South America* (1911), *The Monroe Doctrine and Obsolete Shibboleths* (1913).

BINGHAM, bing'am, JOHN ARENDE (1815-1900). An American jurist and legislator. He was born at Mercer, Pa., and was educated at Franklin College, Ohio. From 1855 to 1863 he served as a Representative in Congress from Ohio, and was chairman of the House board of managers in the impeachment trial of West W. Humphreys, United States district judge of Tennessee, who, in an address delivered at Nashville, Dec. 20, 1860, had advocated secession and was consequently accused of high treason. Mr. Bingham subsequently prepared and introduced the Fourteenth Amendment to the Constitution of the United States. He conducted the prosecution of Mrs. Sumner and others charged with complicity in the plot to assassinate President Lincoln and his cabinet, and was chairman of

the board of impeachment of Andrew Johnson in 1868. After serving four additional terms in Congress (1864-73), he was, in 1873, appointed United States Minister to Japan, which position he held until 1885. Consult J. B. Foaker, "John A. Bingham," in the *Ohio Archaeological and Historical Society's Publications*, vol. x (1902).

BINGHAM, JOSEPH (1668-1723). An English clergyman, educated at Oxford, a tutor there in 1691, and somewhat later a rector near Winchester. Here he wrote his valuable *Origines Ecclesiasticae* or *Antiquities* of the Christian Church (1708-22), which has often been reprinted and translated into various languages. He was made rector of Havant, near Portsmouth, in 1712, and lost his savings in the famous South Sea Bubble of 1720.

BINGHAM, THEODORE ALFRED (1858-) An American soldier and public official, born in Andover, Conn. He graduated from the United States Military Academy in 1879, served in various duties as engineer officer from then until 1890, and subsequently was military attaché at Berlin and at Rome. From 1897 to 1903 he was in charge of the public buildings and grounds of Washington, with the rank of colonel. In 1903-04 he supervised the engineering district of Lake Ontario and Lake Erie, and was then retired from active service with the rank of brigadier general. As police commissioner of New York City (1906-09) he was able, through the employment of military discipline, to accomplish many reforms in his department. He was removed by Mayor Gaynor in 1911 on the ground of insubordination, but in the same year was appointed chief engineer of highways in New York City, and when he retired after two months' service was immediately appointed consulting engineer in the department of bridges. He contributed numerous articles to magazines on New York police conditions.

BINGHAMTON, bing'am-ton. A city and the county seat of Broome Co., N. Y., on the Erie, the Delaware and Hudson, and the Delaware, Lackawanna, and Western railroads (Map New York, E 3). It occupies an area of 10 square miles, at an elevation of 867 feet, and has a picturesque location. The Susquehanna and Chenango rivers unite within the city and are crossed by several bridges. Among the more prominent buildings are the State almshouse, the Binghamton State Hospital for the Insane, the Susquehanna Valley Orphans' Home, St. Mary's Home, Stone Opera House, Armory theatre, public library, municipal building, Federal courthouse, and the Security and the Kilmer buildings. Other features of interest are Ross Park, of about 100 acres, Ely Park, Industrial Exposition grounds, O'Neil Park, and the Supreme Court law library. Binghamton has extensive manufacturing interests, which include boots and shoes, canoes and photographic supplies, cigars, spices, carriages and carriage trimmings, sleighs, leather goods, motors, clocks, furniture, electrical apparatus, clothing, cotton fabrics, medicines, lumber, etc. First settled in 1787, Binghamton was called Chenango Point until, in 1800, its limits were slightly changed and the present name adopted in honor of William Bingham, a proprietor of land in the vicinity. It was incorporated as a village in 1834 and as a city in 1867. Its charter provides for a mayor, elected biennially, who appoints the fire, police, health, park, and public works com-

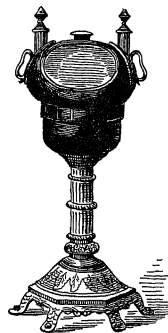
missions (single headed), and the civil service, school, library, and hospital boards. The common council, city judge, assessors, and board of water commissioners are chosen by popular vote. The annual expenditures of the city amount to about \$720,000, the principal items of expense being \$60,000 for the fire department, \$53,000 for the police, and \$175,000 for schools. The water works, built in 1867, are operated by the municipality. Pop, 1890, 35,005, 1900, 39,647, 1910, 48,443, 1913 (local est.), 62,000. Consult Wilkinson, *The Annals of Binghamton* (Binghamton, 1840), and Lawyer, *Binghamton Its Settlement, Growth, and Development* (Binghamton, 1900).

BINGHAM. See BINGEN.

BINGLEY. A town in the West Riding of Yorkshire, England, on the Aire, and the Leeds-Liverpool Canal, 15 miles west-northwest of Leeds. It has considerable woisted, cotton, and paper manufactures. The town owns its water and gas works and maintains a free public library and baths. Pop, 1891, 17,400, 1901, 18,448, 1911, 18,759.

BINMALEY, ben'ma-lá's. A town of Luzon, Philippines, in the province of Pangasinan, 3 miles east of Lingayen (Map Luzon, C 2). It is situated in a level region, on the south shore of the Gulf of Lingayen, at one of the mouths of the Agno River. Pop, 1903, 16,439.

BIN'NACLE (earlier *bitacle*, Portug *bitacola*, corrupted from Lat *habituaculum*, dwelling place from *habitare*, to dwell). A stand for



containing and supporting a ship's compass and its correctors. It is made of brass or wood. The binnacle cover is dome shaped and fits down over the top of the binnacle, protecting the compass, it contains lamps for lighting up the compass card at night, and has a glass plate let into the rear side through which the helmsman can see the compass and thus ascertain the direction of the ship's head. In modern steamers, fitted with electric lights in all parts, the binnacles have electric instead of oil lamps. Binnacles for gyroscopic compasses are usually smaller and flatter than the one shown and have electric lighting near the lubber's point only. See COMPASS.

BIN'NEY, Amos (1803-47). An American physician. He was born in Boston, Mass., Oct. 18, 1803, and died in Rome, Feb. 18, 1847. He was a man of wealth, a patron of artists and scientists, and an early president of the Boston Society of Natural History. He wrote *Terrestrial and Air-Breathing Molluscs of the United States* (Boston, 1847-51, Gould's ed., 1851-59).

—BINNEY, W. G. (born 1833), son of Amos Binney, is a conchologist of note who resides at Burlington, N. J. Besides editing his father's works in a new edition published in the *Bulletin* of the Museum of Comparative Zoology (vol. 19,

1878), he wrote *Land and Fresh-Water Shells of North America* (Smithsonian Institution, Washington, 1869), and many special papers on this subject. The collection of land and fresh-water shells of North America, and preparations of their anatomy, made by the two Binneys, are in the Museum of Comparative Zoology at Harvard University.

BINNEY, HORACE (1780-1875) An American lawyer. He was born in Philadelphia, graduated at Harvard in 1797, studied law in the office of Jared Ingersoll, and was admitted to the bar in 1800. Between 1807 and 1814 he published *Binney's Reports* of the decisions of the Supreme Court of Pennsylvania in six volumes. Though averse to public life, he served in the Twenty-third Congress and took a distinguished part, as an opponent of the Administration, in the debates over the removal of public deposits from the United States Bank. He then withdrew from active practice in the courts and until 1850, when he retired altogether from the bar, confined his legal practice to the preparation of written opinions. Perhaps his most famous case was that of *Bidal v. Girard's Executors*, which he argued before the United States Supreme Court in 1844. His argument in this case is considered to have greatly modified the old conception of the law of charities. Binney was frequently called upon to speak before public meetings, and he published addresses on *the Life and Character of Chief Justice Tilghman* (1827) and *the Life and Character of Chief Justice Marshall* (1835). He also published *A Sketch of the Life and Character of Justice Bushrod Washington* (1858), *Leaders of the Old Bar of Philadelphia* (1858), *An Inquiry into the Formation of Washington's Farewell Address* (1858), and three pamphlets (1862-63) on *The Privilege of the Writ of Habeas Corpus under the Constitution*, in which he supported the policy of President Lincoln in suspending the right of habeas corpus during the Civil War. Consult C. C. Binney, *Life of Horace Binney* (Philadelphia, 1903).

BINNEY, THOMAS (1798-1874) An English Nonconformist divine, born at Newcastle-on-Tyne. He studied at the theological seminary at Wymondley, Hertfordshire, and in 1824 became pastor of St James's Street Congregational Chapel, Newport, Isle of Wight. From 1829 to 1869 he was pastor of King's Weight-house Chapel, London, and from 1869 was professor of homilectic and pastoral theology at New College, London. For 40 years he was famous as a pulpit orator. He was known also as a keen controversialist, attacking the Church of England with much vehemence, and publishing numerous pamphlets in discussion with representatives of the Establishment. He exerted an important influence in the enrichment of the musical services of Dissenters, and wrote considerable devotional verse, of which the hymn "Eternal Light! Eternal Light!" is most familiar. His publications include *Is It Possible to Make the Most of Both Worlds?* (1853), *Miscell., the Priest-Maker* (1867). Consult J. Stoughton, *Memorial of the Late Thomas Binney* (London, 1874).

BINOCULAR MICROSCOPE See MICROSCOPE.

BINOCULAR TELESCOPE A telescope with two tubes and two separate systems of lenses. See OPERA GLASS and TELESCOPE.

BINOMIAL (Lat. *bis*, twice + *nomen*,

name, thing, item). In algebra, an expression consisting of two terms connected by the sign + or -, e.g., $a + b$, $a^2 - b^2$. The terms of the binomial may be any expressions, e.g., $(x - y) + (y - z)$. See POLYNOMIAL.

BINOMIAL COEFFICIENTS The numerical coefficients of the successive terms in the expansion of a binomial $(a + b)^n$, n being a positive integer. For $n = 1, 2, 3, 4$ the series of coefficients are, respectively 1, 1, 1, 2, 1, 1, 3, 3, 1, 1, 4, 6, 4, 1. Each series is got from the initial coefficient 1 by multiplying successively by the descending integers $n, n-1, \dots, 1$ and dividing successively by the ascending integers 1, 2, \dots, n . The general formula for the $(k+1)$ th coefficient is $C_{n,k} = \frac{n(n-1)(n-k+1)}{1 \cdot 2 \cdot 3 \cdot k}$, symbolized by

$\binom{n}{k}$. This is the same as the number of combinations of n things taken k at a time. The coefficients read the same from either end of the series. Their sum is 2^n , but if taken with alternate plus and minus signs, their sum is 0. They have other interesting properties. See, e.g., PASCAL'S TRIANGLE.

BINOMIAL THEOREM A general formula for raising a binomial, $a + b$, to any power, the meaning of the word "power" being extended to include exponents which are not positive integers. The formula is

$$(a+b)^n = a^n + na^{n-1}b + \frac{n(n-1)}{1 \cdot 2}a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3}a^{n-3}b^3 + \dots,$$

where n may be any rational number. In case n is not a positive integer the expansion is an infinite series, which, unless convergent, does not represent the given function to be expanded.

The truth of the binomial theorem for positive integral exponents has long been known to mathematicians, but Newton first extended its application and emphasized its general usefulness.

BINON'DO A suburb of Manila (q.v.), and a centre of commercial and mercantile activity.

BINTURONG, bin'ta-rong (native name). A large arboreal civet (*Arctitis binturong*), allied to the paradoxures, but representing a separate genus of the Viverridae. It inhabits the Malay Peninsula and islands, and is 2½ feet long in body, with a bushy tail nearly 3 feet in length and prehensile, assisting it in climbing. It passes its day asleep in a tree, and at night hunts in a slow, cautious way for animals, birds' nests, etc., and also seems to eat vegetable substances. The adult is black, but younger specimens are grizzled or yellowish. Its fur is long and harsh, and it has long, bristly brown hairs about the mouth, ears, and eyes, giving it a very strange appearance. Its nature is fierce, but it is frequently kept in captivity.

BINUE See BENUE.

BINYON, bin'yon (ROBERT) LAURENCE (1869-) An English poet and artist. He was born in Lancaster and studied at St Paul's, London, and Trinity College, Oxford, where he won the Newdigate prize for poetry. In 1893 he entered the employ of the department of printed books in the British Museum, and in 1895 was transferred to the department of prints and drawings, of which he became assistant keeper in 1909. He edited *The Shilling Garland* in 1895-

98 and was a constant contributor to the *Saturday Review*. He published a catalogue of drawings in the British Museum (4 vols, 1898-1907), essays on Crane and Cotman, the etchings of Stang and the landscape etchings of Rembrandt, reproductions of William Blake's drawings, vol 1 (1906), *Painting in the Far East* (1908, 2d ed rev, 1913), *The Flight of the Dragon, an Essay on the Theory and Practice of Art in China and Japan* (1911), the dramas *Paris and Othello* (1905, produced 1906) and *Attilla* (1907), and, among many volumes of verse, *Lyric Poems* (1894), *London Visions* (1895, 1898, collected, 1908) and *Odes* (1901, new ed, 1913). In 1913 he published *Aquinas and The Art of Botticelli*. Consult Streetfield, *Two Poets of the New Century* (London, 1901).

BINZ, bintz, KARL (1832-1913) A German physician and pharmacologist, born at Benkstel. He studied at Wunzburg, Bonn, and Berlin, and in 1868 became professor at Bonn. In 1869 he founded the pharmacological institute there. He retired in 1908. His more important investigations had to do with experimental pharmacology and pathology. The action of quinine was first defined by him. His publications include *Grundriss der Arzneimittellehre* (1866, 13th ed, 1901), *Experimentelle Untersuchungen über das Wesen der Chininwirkung* (1868), *Das Chinin nach dem neuen pharmakologischen Arbeiten* (1875), *Über den Traum* (1878), *Vorlesungen über Pharmakologie* (1891), *Äther gegen den Schmerz* (1896), *Rezepturen und ihre Folgen* (1899).

BINZER, bintz'er, AUGUST DANIEL VON (1793-1868) A German author. He was born at Kiel and studied law at the universities of Kiel and Jena, where he became one of the most active members of the *Burschenschaft*, or students' society, which was dissolved in 1819 by the government for meddling with politics. Afterward he taught and edited papers in various parts of Germany. He is the author of two famous songs—"Wir hatten gebauet ein stattliches Haus," written on the dissolution of the *Burschenschaft*, and "Stosset an," which still retain their popularity. Among the works published by him are *Venedig im Jahre 1844* (1845), *Erzählungen und Novellen*, written in collaboration with his wife and published under the pseudonym of A. T. Beer (3 vols, 1836). He also translated Benjamin Franklin's *Autobiography and Writings* (1829), and *Night Thoughts*, by Edward Young.

BIOBIO, bió'bio. The largest river of Chile. It rises in the Cordilleras and after a northwesterly course of over 250 miles, with its lower reaches along the valley between the Andes and the Coast Range, empties into the Pacific Ocean just below Concepcion. It has a number of tributaries, has a width of 2 miles at its mouth, and becomes navigable at Nacimiento.

BIOGENESIS (Gk *bios*, *bios*, life + *genesis*, *genesis*, origin, source). The doctrine that the series of forms which an animal passes through in developing from the egg to the adult is an epitome of the stages in the evolution of the species. This is stated briefly in the expression Ontogeny recapitulates phylogeny. The truth of this doctrine seems to have been recognized long ago, according to Meckel (1811), by Aristotle, Hally, Harvey, Kielemeyer, Autenreith, and many other early authors. The law is often called Von Baer's, because in his great work on the development of animals (1828-37)

he demonstrated its truth in detail. Louis Agassiz also laid stress on this law, although he did not accept evolution. The law is based upon observed parallels between ontogenetic changes and assumed evolutionary ones. Thus, at an embryonic stage, man possesses gill slits and a two-chambered heart, like a fish, later the gill slits close and the heart becomes reptilian. A tail like that of lower apes is present at a later stage. At birth the child grasps things with its feet, as the higher apes do, and not until several months after birth are the essentially animal instincts replaced by the human. The tadpole stage of development of many amphibians was formerly one of the standard examples of biogenesis, but it is now thought that the fish-like form and mode of life is wholly secondary and has nothing directly to do with the recapitulation of the frog's phylogeny. Many terms have been coined to express the various stages or modes of growth and development from embryo to old age, but all have been discarded save the popular terms in common speech. The development is so gradual and the stages in different forms of life so dissimilar that all attempts at defining definite steps are useless.

The recapitulation law remains unexplained, it does not hold in detail, but only in a rough and general way. "The embryonic record," says Balfour, "as it is usually presented to us, is both imperfect and misleading. It may be compared to an ancient manuscript with many of the sheets lost, others displaced, and with spurious passages interpolated by a later hand." See EMBRYOLOGY, GASTRÆA THEORY.

Abiogenesis, though apparently merely the negation of "biogenesis," has a somewhat different meaning, the term signifying reproduction by spontaneous generation—not now accepted as a fact in any case.

BIOGEOLOGY See PALEONTOLOGY, PALEOBOTANY, GEOLOGY.

BIOGRAPHY (Gk *bios*, *bios*, life + *graphein*, *graphein*, to write). A term applied to that department of literature which treats of the lives of individuals. The mode of treatment, especially in modern times, is far from uniform. In some cases biography approaches the sphere of philosophy, in others, that of history, while in the majority it assumes, to a large extent, the character of analytic or descriptive criticism. To none of these modes, theoretically considered, can there be any valid objection, everything depends on the judiciousness of the biographer. The great points which he must keep perpetually in view are the personality and characteristics of his subject. If these are buried under a load of digressive dissertations, his book, however valuable or interesting, ceases to be a biography except in name. Such a book, for example, is Masson's *Life of Milton*. Anciently biography was more of a mere curriculum *vite* than it is now, that is to say, the leading incidents of a man's life were narrated in their historical sequence, without any elaborate attempt to analyze the character from which they emanated. Like ancient history, it was possessed of a simple greatness, a stately dignity of narrative, colored here and there, but sparingly, with grave eulogy or censure. Modern biography, on the other hand, like modern history, is full of elucidations, criticisms, and disquisitions, and, if wanting in the severe grace of its classic predecessors, it is much more lively, acute, and expansive.

Biographical literature has existed from an early period. The oldest historical books of the Jews abound with beautiful examples of it, such as the lives of the Patriarchs and the story of Ruth. Indeed, the mythologies of all ancient nations are but the lives of heroes and gods. Of purely biographical works, the most valuable that has come down to us from the Greeks is the *Parallel Lives* by Plutarch, written about the close of the first century after Christ. Roman literature also possessed an admirable specimen in the *Life of Agricola* by his son-in-law, Tacitus. Besides these may be mentioned the *Lives of the Twelve Caesars* (in Latin), by Suetonius, and *Apollonius of Tyana* (in Greek), by Philostratus, *Lives of the Sophists* (in Greek), by Philostratus, and a *Life of Plato* (in Greek), by Olympiodorus of Alexandria. Coming down to a later period, we meet St Jerome's *Lives of the Fathers*, while biographies, more or less complete, of saints, martyrs, bishops, etc., are scattered profusely through private ecclesiastical literature. The monks of the Middle Ages employed their leisure in weaving legends that abound in superstition and absurdities. Modern biographical literature really dates from the sixteenth and seventeenth centuries. Among the valuable works that then appeared may be mentioned Vasari's *Lives of the Painters* (Florence, 1550), the *Acta Sanctorum* (qv), Tillemont's *Mémoires pour servir à l'histoire ecclésiastique des six premiers siècles de l'église* (10 vols., Paris, 1693), Thomas Stanley's *History of Philosophy*, containing the lives, opinions, actions, and discourses of philosophers of every sect (1st ed., London, 1655-62, 4th ed., with Lysle, London, 1743), Bayle's *Dictionnaire historique et critique* (Rotterdam, 1697).

In England and elsewhere the biography of the man of art or letters is a late development. The men who visited the Globe Theatre never thought of writing the life of Shakespeare. To them the career of the dramatist seemed uneventful, for it was in no wise connected with the great affairs of church and state. The signs of a new era appeared with the publication of Walton's charming *Lives* (1670), comprising Donne, Wotton, Hooker, and Herbert. This list, however, contains the name of no one who devoted himself wholly to letters. Walton's volume was followed by Wood's *Athenæ Oxonienses* (1690-92), the lives of Oxford writers and bishops, and by Aubrey's *Minutes of Lives* (not published till 1813), containing sketches of Bacon, Milton, Hobbes, and others. These two writers, who depended largely upon anecdotes, were the forerunners of Boswell, whose *Life of Dr Johnson* (1791) is the most famous of English biographies. Since the appearance of this work biographical literature has increased enormously. There is no escape now for the man of letters. Among noteworthy biographies, since Boswell, are Lockhart's *Scott* (1836-38), Foister's *Dickens* (1872-74), Trevelyan's *Macaulay* (1876), Cross's *George Eliot* (1884), Tennyson, by his son (1897), the *Life and Letters of Russey*, by his son (1901), the *Life of Gladstone* by John (afterward Lord) Morley (London and New York, 1903). Cross adopted the novel plan of letting George Eliot speak through her letters, chronologically arranged, and elucidated by brief remarks. This method, which does away with the fulsome praises of the biographer, is very attractive, and has, perhaps, led to a taste for the correspondence of literary

men. Among notable volumes of letters of recent date are Matthew Arnold's (1895) and Stevenson's (1900). Beginning with Dr Johnson's *Lives of the Poets* (1779-81), there is a long line of works in which biography is combined with criticism. To this class belong Macaulay's essays on *Milton*, *Addison*, etc., Carlyle's essays on *Burns*, *Sterling*, etc., Grimm's *Michael Angelo*, and many series of which the type is represented by the *English Men of Letters*, the *American Men of Letters*, and *Les grands écrivains français*.

Biographical dictionaries date from the *Eleucidarius Carminum et Historiarum* (Holland, 1498). But the nineteenth century was, as the twentieth promises to be, a flourishing period for them. Among the best general dictionaries are the *Biographie universelle, ancienne et moderne* (new ed., 45 vols., Paris, 1843-65), and the *Nouvelle biographie générale* (46 vols., Paris, 1852-77). The best work of the kind published in the United States is *Lippincott's Pronouncing Biographical Dictionary*, by Dr Joseph Thomas, often reedited. Most nations have biographical dictionaries confined to their own celebrities. For Germany there is the *Allgemeine deutsche Biographie*, Bavarian Academy of Sciences (Leipzig, 1875-1900), for Austria, the *Biographisches Lexikon des Kaiserthums Oesterreich*, ed. by Wurzbach (Vienna, 1856-89), for Holland, the *Biographisch Woordenboek der Nederlanden*, ed. Van der Aa (Haarlem, 1852-78), for Belgium, the *Biographie nationale de Belgique* (Brussels, 1866-95), for Sweden, *Biographical Handbook*, ed. Hofberg (Stockholm, 1876), for Russia and Spain there are also good biographical dictionaries. England has the magnificent *Dictionary of National Biography* (63 vols., ed. by Sir Leslie Stephen and later by Sidney Lee, London, 1885-1900), to which were added three supplementary volumes in 1901, and a valuable volume which is entitled *Index and Epitome* (1903), and the United States, Appleton's *Cyclopedia of American Biography* (6 vols., New York, 1887-89), a seventh volume appearing in 1900 as a supplement, and Lamb's *Biographical Dictionary of the United States*. For contemporary biography we have Vapereau's *Dictionnaire Universel des Contemporains*, *Wer ist's?* (Leipzig, 1905), *Qui êtes vous?* (Paris, 1905 ff.), *Men and Women of the Time*, *Who's Who* (London), *Who's Who in America?* (Chicago), and *Who's Who in New York?* (New York), revised annually or biennially. They contain only the biographies of living persons, though reference is made to preceding volumes in the case of distinguished men and women who have died.

Belonging to this department of literature is the autobiography, i.e., the life of a person written by himself. We may cite, for their charm, the *Autobiography* of the first Lord Herbert of Cherbury, Benvenuto Cellini's *Vita da lui medesimo scritta*, Pepys' *Diary* (see PEPYS, SAMUEL), Rousseau's *Confessions*, Casanovi, who wrote (originally in 12 vols.) a most cynically accurate account of his own variegated career (see CASANOVA), Goethe's *Die Welt und Wahrheit*, Gibbon's *Memoirs*, Franklin's *Autobiography*, Scott's *Journal*, Newman's *Apologia*, Ruskin's *Præterita*, *Bismarck*, dictated by Prince Bismarck (Eng. trans. 1890) and *Richard Wagner* (1911). George Moore's *Confessions of a Young Man* (last ed., New York, 1910), like his *Memoirs of my Dead Life*

(1906), is partly autobiography and partly fiction, like the earlier writings of Maurice Barrès (q.v.) (See MOORE, GEORGE) This form of biography often runs into fiction as in Bowrow's *Lavengio*. The interesting development of biography, of which outlines are here presented, has never been adequately treated. See *ENCYCLOPEDIA*

BIOLOGY (from Greek *bios*, *bios*, life + *lógos*, *logos*, discourse) is not an ancient word of Greek origin, but appears to have been coined independently by Lamarck (1801) and by Tiepmanus (1802). In Germany the term "biology" has come to refer to the general habits and life histories of animals and plants, while in France, England, and America the word has retained its broader significance, owing more especially in the latter countries to its use in the writings of Herbert Spencer and of Huxley. In these countries biology signifies the study of the properties common to all living things in contrast to the properties of non-living things. A secondary meaning has also come to be associated with the use of the word, namely, for courses of study in which the general phenomena of both animals and plants are considered, as contrasted with the study of animals alone (zoology) or of plants alone (botany). In its broadest significance biology should stand for the study of all living phenomena, even including the study of human action in its every phase. Usage and tradition have, however, wisely or unwisely, excluded from the subject-matter of biology the historical, social, and political studies of mankind, as well as his psychological, philosophical, and religious views, although by a strange paradox these matters, in so far as they belong to other races and especially to the less civilized races, are sometimes made the subject of biological examination.

The origin of living things on our globe has occupied the forefront of biological speculation. Rejecting the supernatural explanation of former times, modern speculation has found itself in the dilemma of affirming, on the one hand, that living organisms have arisen from non-living substances in the *natural* course of cosmological changes, and, on the other hand, of acknowledging the absence of satisfactory evidence of such an origin. These alternatives are involved in, but should not be confused with, the doctrine of Biogenesis and Abiogenesis. The doctrine of Biogenesis maintains that the evidence we possess shows that living things always arise *at the present time* from other living things. No life without preceding life is now the universal rule on the earth. This is one of the most general and important deductions of biological science, but our present standpoint has only been reached after the most patient and laborious work of many years and many brains. As far back as human history goes we find a tradition that the lower and the less familiar animals and plants arise continually out of slime and filth, and in the dark and mysterious corners of the universe. Aristotle accepted this view of Abiogenesis, and throughout the Middle Ages it was generally held. That maggots arise in foul meat, that insects spring forth from the leaves of the plants on which they appear, that disease and pestilence arise spontaneously from the marshes and in crowded and dirty communities, and from the unburied dead of battlefields, has been believed and is still believed. One by one these ideas have been demonstrated to be myths. Redi, in 1668, showed conclusively and finally that mag-

gots are not engendered in foul meat, but come from the eggs of flies, the discovery of the complete life cycles of the lower animals leaves no possibility of spontaneous generation in their development, the discovery that putrefaction is due to bacteria and other microscopic organisms has finally removed any lingering doubt on this score, and the triumphs of experimental medicine have shown that contagious disease is not spontaneously bred inside or outside of the animal body, but is transmitted by minute germs from place to place. The classical work of Pasteur and of Tyndall has convinced all thoughtful men that fermentation and putrefaction do not occur unless organisms have access to the putrescible substances.

All life from preceding life is the motto of modern science, Biogenesis, not Abiogenesis. But whence came the first life on our globe? It has been suggested that it was brought to the globe from outer space by falling meteors. This suggestion only pushes the problem farther off and gives no solution of it, even if there were the slightest evidence in favor of such an extraneous origin of life. It has also been suggested that in a former condition of our planet, when the physical conditions were different from what they are at present, organic substances were produced from inorganic matter, and out of these organic substances living substances arose. This hypothesis has at least the great merit that it can be tested, for if the process once occurred we might expect to repeat it in our laboratories, since there is no reason to suppose that at the time when the earth had sufficiently cooled to allow organic matter to exist the conditions were different from those that can be produced with modern appliances. In fact, with the wonderful development of modern organic chemistry many of the older distinctions between organic and inorganic matter have disappeared.

It was long supposed that organic compounds, as the name implies, were formed only by organisms, and not by the synthesis of inorganic or "dead" substance. Wohler's synthesis of urea in 1820 was the first step in the artificial production of organic compounds. Since that time there has been a constant increase in the number of such compounds produced in the laboratory. Still more important is the fact that such widely distributed organic compounds as sugar and xanthine have been synthesized, and even compounds closely resembling the peptones that approach most nearly the proteids in composition have been artificially produced. Fischer's synthesis of these compounds and his study of the splitting products of the proteids themselves have shown the way at least in which the proteids themselves may ultimately be synthesized. When it is recalled that the proteids form the basis of all living material, the very great importance of this work will be manifest. Of equal interest is Kossel's work on a substance, *protamin*, derived from the sperm of animals. He has shown how this protamin might be built up into the proteid molecule, and while protamin has not yet been artificially produced there seems to be no difficulty in the way of its production aside from the labor involved, i.e., its production seems to lie within the limits of known chemical processes. The discovery of a large number of ferments (enzymes, etc.) in almost all the organs of the plant and animal, and the study of the action of these ferments, both inside and outside of the body, has thrown a flood of light on a

great number of physiological changes—changes not only in the digestion of food materials, but in the metabolism of the protoplasm and in its growth. Many of the chemical changes in the body seemed inexplicable before the discovery of these ferments which have the peculiar property of bringing about chemical combinations without themselves becoming altered or lost in the process—acting as middle men in a chemical transaction, without, however, profit or loss to themselves. The further discovery of the reversible action of some of the ferments has also helped explain how a proper balance between the substance to be transformed and that already transformed is reached, for an excess in either direction leads to a reversal of the action of the ferment. Here we begin to get an insight into certain chemical transformations that recall some of the well known regulative properties of organisms, in fact one physiologist of note has gone so far as to look upon changes of this kind as vitalistic rather than mechanical.

Our understanding of the physical and chemical nature of protoplasm has also been greatly enhanced by recent discoveries concerning the properties of colloidal solutions. Colloids are substances that do not diffuse through animal or vegetable membranes. The molecules carry charges of electricity which can be changed in certain ways, such as through the action of certain dilute salt solutions. The living protoplasm behaves in so many ways as do these colloidal solutions, that an insight into the physical nature of these substances promises to solve some of the most difficult problems connected with the "physical basis of life." Lastly, the theory of dissociation, especially as applied to dilute salt solutions, promises to give another means of elucidating certain reactions of the protoplasmic materials. From these and from other results it appears that the lines are slowly but surely closing in on the ultimate biological problem of the constitution of living matter. When analysis and synthesis meet, we shall be in a position to determine whether inorganic matter, transformed into organic matter, will show the properties of living things. Until that time arrives it is pointless to discuss the problem of the origin of life, but to have found means by which we may hope at least to reach ultimately a solution of the problem is one of the triumphs of modern chemistry.

The dictum that all life comes from preceding life has been extended to smaller units of the organism. The formulation of the cell theory in 1838-39, by Schleiden and Schwann, has been followed by a minute study of these units of which all the higher organisms are composed. It was discovered that each cell arises from a preceding cell by a process of division. *Omnis cellula e cellula* was proclaimed. Within each cell there is a central vesicle or sphere known as the nucleus, when the cell divides the nucleus divides also, and each daughter cell gets half of the original nucleus. Other bodies have also been found within the cell and within the nucleus, such as chlorophyll grains and plastids of different sorts, the centrosome and the chromosomes, etc., that also divide. Carried further, we can imagine the cell peopled with innumerable units, so that all the properties of the cell can be ascribed to these minute bodies or granules. *Omnis granulum e granulo* has also been claimed to be true.

Based on views of this nature, several biologi-

cal systems have been promulgated in recent times by noted biologists, that of Weismann being perhaps the most elaborated, the most famous, and the most contested. On this theory each character of the individual is supposed to be represented in the germ by one or more units called biophors. These biophors are imagined to be combined into larger groups called determinants, which in turn form groups called *ids*, and these collectively make the threads of visible chromosomes found in the nucleus. To the biophor is ascribed the property of growth and division. After a certain size is reached the biophor divides in the same way as the cell. At each cell division, or preceding it, these smaller units of the cell are supposed to divide so that each daughter cell contains half of all of the units of the original cell. In this way each cell inherits the peculiarities of the original cell, and heredity means only the passing on from one generation to the next of each kind of biophor. The "continuity of the germ plasma" is brought about by this means.

When the cell develops it produces by division an immense number of cells, all essentially alike. Most of these form the body of the individual, i.e., the soma, the rest remain as germ cells to continue the propagation of the race. The individual, or *soma*, has been compared to a nurse that protects and nourishes the germ cells. The individual is, from this standpoint, of secondary importance. It represents the interest spent in each generation to keep in existence the immortal property of the individual, represented by the germ plasma.

The argument that the elements of the individual are contained in separable units that lead an independent life of growth and division is not, however, essential to the view of the continuity of the germ plasma, for it is equally conceivable that any part of the protoplasm may contain within itself the potentiality of producing all the characters with which the race or species is endowed. It is true that we find within the egg-cell different kinds of substances, and we can imagine that the differentiation of the cell may be connected with the presence of certain of these substances, but the visible elements or substances in the egg appear to be vastly less than the characters of the individual that develop from the egg, and it seems more in accord with our present knowledge to assume that the polymorphic nature of the protoplasm is the basis for character formation, than to assume a different substance for each character. From this point of view the continuity of the germ plasma means the separation at each cell division of a reasonably small number of substances, each having the potentialities of forming different combinations. In other words, the variable substances of the germ are products of the common protoplasmic basis.

The theory of the continuity of the protoplasm accounts sufficiently for heredity, and will suffice to explain the continuity of existing species, but it leaves unaccounted for the possibility of the formation of new species. A discussion of the origin of species belongs more especially to the field of evolution, but in so far as certain fundamental biological questions are involved the problem must be briefly referred to.

Biologists are divided into two schools regarding the causes of variability in the germ plasma. One school, the older, assumes that external influences that affect the body may also affect the

germ cells in the same way, so that changes in the environment may cause the evolution of a new form. Closely associated with this idea is the view that any changes in the body, either brought about directly by external influences or indirectly through its own activities, are carried to the germ plasma, which is sensitive to all such changes and becomes modified accordingly. In this way each and every change, by means of which the organism adapts itself to the outer world, is supposed to be transmitted to the germ, so that the next generation starts where the former one left off. Some of the individuals of a species, adapting themselves to certain conditions, become modified to suit those conditions, others become modified to suit other conditions. In this way a species becomes separated into several species.

Another school denies that adaptation has arisen in these ways, although the followers of this school separate into several groups according to the methods invoked to account for the formation of new types, and for the origin of adaptation. Darwin and his followers appeal to fluctuating variations as the chief source of species formation and of adaptation. Observation shows that no two individuals are exactly alike. A statistical examination of these differences shows that they conform to Quetelet's (sometimes spoken of as Galton's) law of probability. According to this law, the individuals of such a group will form, if arranged according to their measurements, a curve known as the curve of probability. The resulting form of such a curve is something like an inverted Ω . There are more mediocre individuals in the middle, and fewer that depart from mediocrity in each direction. The Darwinian school assumes that if the individuals belonging to the one or the other sides of the middle possess any advantage in "the battle for existence" they will survive, and the next generation will be modified in the direction of this selective process. In time the change may be so great that a new variety or a new species will be formed. Thus adaptation and species formation go hand in hand.

Other biologists refer the modification of the species to other kinds of variations. In recent years discontinuous or definite variations—also called mutations—have been claimed to furnish the materials for evolution. A mutation is a spontaneous variation that appears in the germ-plasm and expresses itself in the next generation. A mutation differs from a fluctuation in two essential aspects: first, it appears suddenly and is completely formed from its first appearance; second, if a mutant is bred to another mutant of the same sort (or, if a hemaphroditic mutant be self-fertilized), all the offspring are, as a rule, like the new form. Mutations have been recorded for a number of animals and plants, and it seems not improbable that the formation of domesticated breeds of animals or plants owes its origin in part to the picking out of such new forms. The change from the old form to the new may be small, and even not transgress the limits of fluctuation, but the difference between the two kinds of variation seems apparent when it is found that the mutant transmits to all its offspring its new characters, and there is no return to the original type. Failure of practical breeders to distinguish between these two kinds of variation may have led to the erroneous opinion that their results have been obtained through the selection of

fluctuating variations. One of the peculiarities of some of these mutants is that when crossed to the parent type they transmit to some or to all the offspring their new character in full force. Thus the original type, whenever crossed with the new type, will have grafted to it, as it were, the new character. Instead of the new type becoming swamped, by back crossing, the parent type is the one that is lost or changed whenever it meets the new form. The chance of an individual mutation surviving is small compared with the chance of its crossing with the parent type, but if the mutation is of the sort described—and such are known—it may be perpetuated despite back crossing.

If mutation has been one of the means by which evolution has taken place, the question of greatest biological interest is the cause of the appearance of such types. That the germ plasma has suddenly changed its character seems clear, but the cause of this change, whether internal or external, is unknown. Theoretically it seems necessary to assume that external causes must give the stimulus, but the effect is indirect, and the change in the germ plasma must be held to be the chief factor in the result. It is recognized that external conditions are largely responsible for fluctuating variations, and it seems plausible that they may indirectly bring about also mutational changes. Galton's simile of a polyhedron enables us to form a picture of the difference between the two kinds of change. A disturbance may cause the polyhedron to rock back and forth on the face on which it stands. This is comparable to fluctuation. A greater disturbance may cause the polyhedron to roll over on to a new face. This would correspond to a mutational change in a species.

The most general characteristics of living things, as contrasted with non-living matter, may be included under the categories of reproduction, rejuvenescence, waste and repair, growth, regulation, irritability, and memory.

Reproduction. No inorganic substance, and not even a machine, has the power to throw off spontaneously small portions of itself that will increase in size and undergo changes in form until the original size and arrangement of parts is attained. All organisms have this power, and it is largely through its possession that they are able to maintain themselves and meet the accidents to which all living things are continually subjected. Not only do organisms perish through external agencies, i. e., accidentally, but in all the higher forms, and in most of the lower forms also, the length of life of the individual is limited, and its place is taken by its offsprings. Many methods of reproduction exist. They fall, however, into two groups, the sexual and the non-sexual. Animals and plants reproduce non-sexually most simply by dividing into two parts or by producing buds, but chiefly, especially in plants, by setting free single cells called spores, generally protected by a tough surrounding membrane. In animals, the formation of parthenogenetic eggs leads to the same result, but while a spore does not in most instances represent an egg, in animals the parthenogenetic egg appears to have been at one time an ordinary egg requiring fertilization, which has later acquired the power to develop without fertilization. In recent years it has been found possible, by artificial means of many kinds, to induce almost all kinds of ordinary eggs to develop without fertilization, i. e., parthenogenetically.

The other method of reproduction, the sexual, consists in the union of two cells, derived in most cases each from different individuals. These two kinds of cells are known as eggs (or ova) and spermatozoa. Each cell has become specialized in a different way—the egg, as a storehouse of material to be used in development, the spermatozoon, as a motile form capable of finding and entering the egg. A biological problem of great importance in relation to sexual reproduction is whether there is any advantage of this method over the other, or non-sexual method, for it is manifest that the sexual process involves also disadvantage, since it requires twice as many individuals as does the non-sexual method. In other words, if all the individuals were females, twice the number of eggs could be produced and there would be double the chance of survival of some of them. Many attempts to answer this question have been made, but none have proven satisfactory. It has been claimed, for instance, that by the union of cells derived from two individuals the chance of producing new variations is given through the combination of their individual differences (Weismann), but it seems more probable, on the contrary, that continual crossing of this sort would tend only to reduce all individuals to the same standard and obliterate any individual difference that might arise. The older zoologists were so convinced that sexual reproduction must take place that they believed no species could continue to reproduce itself indefinitely by means of spores or by parthenogenetic eggs, yet a number of such species are now known, both in the animal and in the plant kingdom. Nevertheless, it is true that in nearly all forms reproducing by spores or by virgin eggs, sexual reproduction sooner or later occurs. Even in the lowest or unicellular forms, that may reproduce for hundreds of generations by simple division, it has been found that after a time division ceases and death follows unless conjugation takes place, after which the division cycle begins again with renewed activity. This renewal of vigor as the result of conjugation has led many biologists to assume that the function of fertilization is to make young again or rejuvenate the living individual.

Rejuvenescence The great vigor and immense vitality of youth are so familiar to us in our own species that it needs no further exposition, especially when we see abundant evidence of the same thing in other organisms. If rejuvenescence were always associated with sexual reproduction, it would seem a probable explanation of the advantage of the process, but it cannot be claimed that this is the only way in which rejuvenescence takes place. It is true that in a few cases parthenogenetic eggs may not develop as well as fertilized eggs, but in the great majority of cases they develop equally well, and the young, so far as known, show no lack of vigor. It would seem that an egg may become as well adapted to the one process as to the other. Nor can it be claimed in those cases where sexual and non-sexual forms alternate in the same cycle that the generations produced by budding or by spores show less vigor than those produced by fertilized eggs. On the other hand, close inbreeding of forms adapted to cross fertilization is generally supposed to be injurious, but here also there are exceptions, for some plants seem adapted to this process alone. The difficulties in the way of reaching even a probable conclusion are thus seen to be very great, but Darwin's de-

ductions from his own experiments and wide knowledge of the results of others seem to hold, namely, that some advantage results when an egg is fertilized by a spermatozoon of an individual that has lived in a different environment. How this result is reached we do not know, possibly in time physiological chemistry will throw light on the problem.

It must also be remembered, and even emphasized, that sexual reproduction is not the only way in which rejuvenescence through the germ cells may be accomplished. In some organisms other agencies may give rise to the same effect. In fact, the discovery of artificial parthenogenesis suggests many ways in which the same end may be attained.

Not only is rejuvenescence found in reproduction by means of sex cells, but an apparently identical process occurs in the formation of buds. The differentiated protoplasm has the power of returning under certain conditions to the embryonic condition, associated with which is found a renewal of vigor. In the regeneration of a new part from old tissues an analogous phenomenon occurs, if we may judge by the enormous increase in the powers of growth.

Waste and Repair, Growth Organisms conform to the laws of energy of lifeless matter, in that they have no power to create energy, but can only transform one kind of energy into another. Plants derive their energy in the first instance from the energy of light, more particularly sunlight. Once having changed this energy of light into the energy of chemical combination, the latter can be stored away for future use. The protoplasm itself is such a storehouse, it is a highly unstable compound capable of setting free a large amount of energy. Energy is also stored up by plants in the form of insoluble starch. The starch is changed by means of a ferment into sugar, which, being soluble, can diffuse into those regions where it is in excess to those regions deficient in sugar, where it may be used as food, i.e., as material for building up new protoplasm. Animals do not possess the power of transforming the energy of light into chemical energy, and all their energy is traceable ultimately to plants which they use as food. The chemical energy of the protoplasm and of the other organic constituents of plants supplies all the energy of animals, the food substance becoming incorporated in the animal tissues without first breaking down into their elements. While part of the energy of the plant may be lost in the transformation, the greater part of it is retained by the animal. The fact that animals and plants derive absolutely all their energy from external sources, and lack completely the power to make energy of any sort, goes far towards establishing the uniformity of the laws governing living and lifeless matter. In other words, these energies which taken together constitute what is called briefly *life* are all derived from the energies of the chemical compounds of which the organism is composed. The greatest generalization of physics, the law of the conservation of energy, applies as inexorably to living as to lifeless things. The question must still, however, be left open as to whether the transformation of energy that occurs in the brain, for example, may not involve forms of energy as yet undescribed by the chemist and physicist, but if such be found, it is safe to prophesy that they must conform to the law of the conservation of energy.

In order to do work of any kind, to move, to secrete, to think, energy must be liberated, and this is accomplished by the breaking down of the materials of the animals, such as the muscles, the glands, or the brain. The organism has a remarkable capacity to build up again its broken-down substances by means of the food stuffs that are made by plants and obtained from them by animals. This power to replace what is lost after work has been done, is one of the fundamental, but least understood, properties of living things. In consequence of this same or of some similar power, organisms grow when the waste is less than the construction that is taking place. Growth is not, however, so simple a problem as this, for there are distinctive powers of growth associated with each phase of the life cycle. Growth is a special feature of "young" or rejuvenated tissues. As the organism approaches a certain size, its power of growth slowly declines and then ceases entirely. Most remarkable is the fact that this cessation is not due to the loss of the power of growth, but to some inhibition of the process, as shown by the power of replacement or regeneration shown by most organisms. If the limb of a salamander that has ceased to grow is removed, a new limb is regenerated. It is reproduced out of the same tissues that had ceased to grow. The new limb will in time also cease to grow when it has reached a size characteristic of the stage of development which the animal has reached when the loss occurred. The factor that regulates the extent of growth of each species is entirely unknown. It appears to be connected with the differentiation of the tissues, but the differentiation is in turn intimately connected with the relation of cells to neighboring cells. Possibly the pressure relation of the cells may be the "formative factor" involved, and if so the formative force of the earlier biologists may turn out to be the response of the organism to pressure and tension relations. Reaction to contact or touch (called stereotropism) is one of the most general characteristics of adult organism, and there is much to indicate that the individual cells of the embryo respond to the same stimulus.

Regulation. Organisms show in many ways a power to adapt themselves directly to changes in their environment. Use of a part brings about an increase in its size, strength, and power to perform its functions more perfectly, as seen especially in the muscular and nervous system. Pressure on the skin may cause it to become thicker, exposure to sunlight "tans" the skin and protects it from burning. The rate of beat of the heart, and the respiratory process regulate themselves to the activity of the body, etc. The most wonderful regulations are seen in the development of the embryo, where the development of the parts depends on a subtle power of adjustment. The highest expression of this power is seen when a part of an egg or embryo produces an entire organism of reduced size.

The responses of animals regulated through the central nervous system fall also into this class, especially those that are not tropisms and instincts, but which have been acquired by experience. Fear, for instance, which is instinctive apparently in some animals, develops in others with extraordinary facility after the briefest experience. These regulations through the central nervous system separate more strongly than any other differences living from lifeless things. They may be analyzed into two

parts, first, the transmission of the stimulus, and second, the changes in the centres that determine how and where the outgoing nerve impulse, that follows, shall act. Sense organs are those parts of the surface layers that are specialized to receive certain impressions, and are connected by nerves with the central organs. There are some facts that seem to show that a chemical change is induced in the sense organ that transmits an impulse to the nerve. The character of the nerve impulse is unknown. It is carried into that ganglion cell of the central system connected with the nerve, and it is supposed that within the cell the regulation of the outgoing impulse takes place. The character of this regulation is hardly surmised. It is true that there seem to be certain prearranged paths of least resistance through the central nervous system that determine the direction of the outflow of impulse received, but experience also seems in part to determine the paths of least resistance which come to be those most often used to accomplish an end.

Associated Memory. The reactions of the higher animals are determined in part by their individual experiences. This means that the consequences that have followed from a given reaction may determine whether the same reaction is repeated as at first or is inhibited. The lower animals have been supposed to learn very little from experience, but to react always in the same way to the same external stimulus. More careful observations have shown, however, that their reactions are not so stereotyped as had been previously supposed, and there is evidence that the character of a reaction may be affected by the last reaction, and possibly also by the experience that has followed. If the difference between the first and the second reaction involves only a difference in the physiological state of the organism, and is not influenced by the experience that has followed the reaction, the change may be due to something like memory, but memory not connected with the results of experience, and only with the difference in the physiological state induced by the stimulus. It is, however, only a step further to imagine that the resulting experience may also induce a physiological state that becomes associated with the physiological state that follows the reaction, just as the reaction is associated with the stimulus. Whether this change in reaction, involving something like memory, is accompanied by consciousness, we do not know and have no means of discovering. If we judge by the similarity of the results to those that follow in ourselves, we might be inclined to impute consciousness to these organisms, but we should not forget that in ourselves certain kinds of changes may take place in our reactions as a result of experience that do not rise to a conscious state. In its simplest form memory is an alteration in a reaction in conformity with past experience, in its highest forms memory is a recalling of the entire chain of events without either the original stimulus being present or any action following. Self-consciousness has been cleverly, but perhaps superficially, defined as associated memory. It is probable that nothing is remembered unless something recalls the peculiar state of the brain that stands for a particular memory, but the important point is that other subsequent associations than the original sequence may equally serve to awaken the memory. There are analogies in inorganic nature, as when, for instance, the after effect of

a reaction persists so that a second reaction is different from the first, or as when a piece of wire is once bent it is more easily bent in the same place a second time, but in these inorganic changes nothing has been found comparable to the substitution of one stimulus by an associated stimulus, which is one of the chief characteristics of memory,—a change, moreover, that takes place with great ease and rapidity in most animals

The higher functions of the central nervous system of man are so little understood in their biological significance that any comparison between them and the phenomena of the inorganic world would be extremely unprofitable at the present time. Consult Thomson, *Science of Life* (London, 1910), Huxley, *Discourses Biological and Geological* (New York, 1897), Sedgwick and Wilson, *Introduction to General Biology* (New York, 1895), Haeckel, *Wonders of Life* (New York, 1904). See BACTERIA, CYTOLOGY, CELL, REPRODUCTION, WEISMANN, MENDELISM, DARWIN, LAMARCK, HERPITY

BIOLOGY This term has often been used of plants, especially in Germany, instead of ecology (qv), though biology in this sense usually includes the more sensational topics of ecology, such as pollination, carnivorousness, etc., rather than the broad field which is now known as ecology. The term in this sense should be discarded.

BI'ON (Gk *blōn*) OF SMYRNA. A Greek bucolic poet, of the latter part of the second century B.C., a younger contemporary and imitator of Theocritus (qv). Of his works there are extant 17 short poems and his longer "Lament for Adonis" (*Ἐπιτάφιος Ἀδωνιδος*), in 98 hexameters, a hymn of great beauty and tenderness, which shows many reminiscences of Theocritus' first idyl. It became itself the model for Shelley's *Adonais*. Bion was inferior to Theocritus in directness and dramatic power, he is more rhetorical and more sentimental. The "Lament for Adonis" dealt with that day of the festival of Adonis (qv) on which his death was lamented. The poems are edited with Theocritus and Moschus, by Ahrens (1855), Meineke (1856), Ziegler (1868), the *Ἐπιτάφιος* was edited, with translation and explanatory introduction, by Wilamowitz-Moellendorf, *Adonis* (1900). Wilamowitz edited the text in the *Oxford Classical Text Series*, in 1905, in a volume called "Bucolic Græci." Consult Smyth, *Greek Melic Poets* (New York, 1900). Andrew Lang translated Bion, together with Theocritus and Moschus, in 1889. Consult Susemihl, *Geschichte der griechischen Literatur in der Alexandrinischen Zeit* (Leipzig, 1891), and, for text and translation, Edmonds, *The Greek Bucolic Poets* (London, 1912).

BIONDO, byōn'dō, FLAVIO. See FLAVIO BIONDO.

BI'ONOMIC'S (Gk *bios*, *bios*, life + *nomos*, law), or **ETHOLOGIC**. The science which deals with the relations of animals or plants to their surroundings, called also ecology, a term formerly especially used by botanists, but now equally used by zoologists in the widest sense. The science is a new one and has as yet too few adherents. Charles Darwin, Fritz Müller, and Karl Semper are the best examples of workers in this field. Some of the topics with which bionomics deal are: The relation of animals to their inorganic environment, the relation of aquatic organisms to the chemical nature of the

water, to its density, to its volume, to its temperature and currents, to light, and to gravity, the relations of land animals to the humidity and temperature of the air, to the other chemical and physical properties of the medium, to light, to gravity, and to air currents, the relation of organisms to alternate submergence and desiccation, their relation to shelter and homes, the relation of animals to their organic environment, their relation to food, to mates, to the nutrition and care of young, or to enemies, animal communities, and the interdependence of organic species, as in parasitism and commensalism or symbiosis. Most of these topics are separately treated elsewhere. Consult Waether, *Einführung in die Geologie*, parts 1, 11, *Bionomie der Meerestiere und Lebensweise der Meerestiere*. See ECOLOGY.

BION'OMY. See PALEONTOLOGY, ECOLOGY, DISTRIBUTION OF ANIMALS, DISTRIBUTION OF PLANTS.

BIOPHOR. See BIOLOGY.

BIORNEBORG. See BJORNEBORG.

BIOT, be'd' or byo, EDOUARD CONSTANTIN (1803-50). A French writer on China. He was born in Paris, July 2, 1803, and was a son of the astronomer J. B. Biot. After a short service in railway enterprises he devoted himself to the study of Chinese and contributed many valuable papers to the *Journal Asiatique*. He prepared a *Dictionnaire des villes et arrondissements de l'empire chinois* (1842), *Essai sur l'histoire de l'instruction publique en Chine et de la corporation des lettrés* (1847), *Mémoire sur les colonies malaises et agricoles des chinois* (1850), *Le Tchou-ly, ou rites des Tchou-ly*, a translation, with notes, of an ancient work on the government institutions of the Chou dynasty (1851), and he wrote *De l'abolition de l'esclavage ancien en occident* (1840), for which he received a gold medal from the Institute. He became a member of the Academy in 1847.

BIOT, JEAN BAPTISTE (1774-1862). A distinguished French physicist and astronomer. He was born in Paris and early entered the artillery, but forsook the army for science. He was appointed a professor of mathematics at the Ecole Centrale of the department of Oise and in 1800 became professor of physics in the Collège de France. He was made a member of the Institute in 1803, and in 1804, at a meeting of that body, called to vote in favor of establishing an empire, Biot refused to vote. With Aiago he was made a member of the bureau of longitude, and (1806) sent to Spain to supervise the triangulation involved in the measuring of an arc of meridian, preparatory to the introduction of the metric system of weights and measures. Together with Aiago he also made an exact determination of the force of gravity in Paris, and they were associated in a number of scientific investigations. Biot was able to demonstrate by direct experiment that the velocity of sound in solids was greater than in air, and he was the founder of saccharimetry by the use of the polariscope. In company with Gay Lussac, he made in 1804 the first balloon ascent for the purpose of making scientific observations. His most valuable contributions to science deal with the polarization of light, and his researches connected with ancient astronomy are also very valuable. Among his writings are *Traité élémentaire d'astronomie physique* (3 vols., Paris, 1805), 3d ed., considerably augmented (1850), 6 vols., with vol. of plates—

translated into English, *Traité de physique* (4 vols, 1816), *Précis de physique*, an abridgment of the former in 2 vols (1818), often republished, *Recueil d'observations géodésiques*, etc (1821). Among the most important of his later works are *Recherches sur plusieurs points de l'astronomie égyptienne* (1823), *Recherches sur l'ancienne astronomie chinoise* (1840), *Mémoire sur la constitution de l'atmosphère terrestre*, in the *Connaissance des temps* (1841), *Mélanges scientifiques et littéraires* (1858), *Études sur l'astronomie indienne et sur l'astronomie chinoise* (1862).

BIOTITE, or **BLACK MICA**. A mineral of the mica group consisting of an orthosilicate of potassium, magnesium, aluminum, ferrous and ferric iron. It occurs in monoclinic tabular crystals similar to those of muscovite (qv) and characterized by the basal cleavage common to the micas. It is possible, by reason of this easy cleavage, to split crystals of biotite into extremely thin plates. It is also found in disseminated scales and massive aggregates. Biotite is commonly dark green to black in color with a vitreous or pearly lustre, often submetallic in the dark colored varieties. It is an important constituent of many igneous rocks and is common in most granites and in many syenites and diorites. Large crystals and plates of biotite are especially characteristic of pegmatitic granites.

BIPENNIS (Lat bis, twice + *penna*, wing, edge). A double-headed axe.

BIPLANE. See **AERONAUTICS**.

BY-PONT EDITIONS (*Bypontum* is Latin of Ger *Zweibrücken*, from *bis*, double + *pons*, bridge). A name given to a classical series of 50 volumes, begun at Zweibrücken (1779) and finished at Strasbourg.

BIQUADRATIC EQUATIONS (from Lat. *bis*, twice + *quadratus*, squared). Equations of the fourth degree in one or more unknowns or variables. They are often also called quartic equations. The solution of the biquadratic equation in one unknown was first given by FERRARI (1522-62). Other solutions were given by DESCARTES and EULER. The quadratic, cubic, and biquadratic equations are all solvable by radicals. But this is the end of the series in this direction. The equations of higher degrees are not solvable algebraically, but require the use of transcendental functions for their solution. See **ALGEBRA, EQUATION**.

The biquadratic equation in two variables defines a quartic plane curve. For its theory, consult SALMON, *Treatise on the Higher Plane Curves* (Dublin, 1852, 3d ed, 1879).

BIR. See **BIREK**.

BIRAGO, bé-ra'gò, KARL, BARON VON (1792-1845). An Austrian military engineer, born at Casenna d'Olmo, near Milan. In 1825 he invented the military bridge named after him, consisting of detachable blocks and pontoons—an invention adopted by the Austrian army in 1828. He erected the military bridge across the Po, at Brescello (1839), which was followed, a few years later, by a similar bridge across the Danube. His system of constructing military bridges was adopted by nearly all the armies of Europe. He wrote *Untersuchungen über die europäischen Militärbrückentranss*, etc (1839) and *Anleitung zur Ausführung der im Felde am meisten vorkommenden Pontonbrücken*.

BIRCH *Betula*, a genus of plants of the family *Betulaceæ*. The subfamily *Betuleæ* con-

tains two important genera, *Betula* and *Alnus*, birch and alder, the plants of which are all trees or shrubs, natives of temperate and cold regions.

Birches are found from the Arctic Circle to Texas, southern Europe, Himalayas, China, and Japan, about 30 species being known, a dozen of which are found in North America. The common birch (*Betula alba*) has small, triangular, doubly serrated leaves. In the south of Europe it is found only upon mountains of considerable elevation. It is a tree of rapid growth. In favorable situations it attains the height of 60 or even 70 feet, with a diameter of $1\frac{1}{2}$ or 2 feet. In the northern or utmost alpine limits of vegetation it appears only as a stunted bush. The bark is smooth and silvery white, and its outermost layers are thrown off as the tree advances in age. The smaller branches are very slender and flexible, and in a particularly graceful variety called the weeping birch (*Betula pendula* of some botanists) they are still more slender, elongated, and pendulous.

The bark and leaves of the birch are, in some northern countries, used medicinally in cases of fever and eruptions. The bark is also used for yellow dye. It is in some countries made into shoes, hats, drinking cups, etc. In many parts of the north of Europe it is used instead of slates or shingles by the peasantry, and in Russia—the outer or white layers being subjected to distillation—there is obtained a reddish empyreumatic oil called birch oil, it yields also the birch tar, or *degutt*, which is employed in the preparation of Russia leather. The wood is in universal use in northern countries for a great variety of purposes. It is white, firm, and tough and is employed by wheelwrights, coopers, turners, etc. It is much employed for smoking hams, herrings, etc., because of the flavor which it imparts. Much of it is made into charcoal for forges. In the highlands of Scotland and in many other countries the sap is used, either in a fresh or in a fermented state, as a beverage. The white birch of North America (*Betula populifolia*) very nearly resembles the common birch, but is of much less value. It is found as far south as Pennsylvania. The wood is scarcely used. The black birch, or river birch, of North America (*Betula nigra*), also sometimes called red birch, is similar to the common birch and produces very hard and valuable timber. It attains the height of 70 feet. The bark is of a dark color, the epidermis in the younger trees reddish. The name "black birch" is also given to a species that is found in the more northern parts of North America and is sometimes called the sweet birch, or cherry birch (*Betula lenta*), this also is a tree 70 feet or more in height, of which the timber is fine-grained, and valuable for making furniture and for other purposes. The bark of this species yields an essential oil identical with oil of wintergreen. Its leaves, when bruised, diffuse a sweet odor and, when carefully dried, make an agreeable tea. The yellow birch of North America (*Betula lutea*) is a tree 70 to 80 feet high, destitute of branches for 30 to 40 feet, and remarkable for its large leaves, which are 3 to 5 inches long, as well as for the brilliant golden yellow color of the epidermis. It is found in Nova Scotia, New Brunswick, Maine, etc. Its timber is used for furniture and occasionally in shipbuilding. The young saplings of all these American species are much employed for making hoops for casks. The paper birch (*Betula papyrifera*) is found in the

northern parts of North America. It attains a height of 70 feet. The bark of the young trees is of a brilliant whiteness, and capable of division into very thin sheets, which have been used as a substitute for paper. It is used by the Indians for canoes, boxes, buckets, baskets, etc. The wood is used for the same purposes as that of the common birch. The mountainous districts of India produce several species of *Betula*. Thin, delicate strips of the bark of the *Betula utilis* are used for lining the tubes of hookahs. They were formerly used as writing paper. *Betula alnoides*, a native of the mountains of Nepal, is a tree 50 to 60 feet high, covered with branches from the base, and of an oval form. Its wood is strong and durable. The dwarf birch (*Betula nana*) is a mere bushy shrub, seldom more than 2 or 3 feet high and generally much less. It has orbicular crenate leaves. It is a native of the northern regions of the globe and is found in some parts of the highlands of Scotland. It is interesting because of its uses to the Laplanders and other inhabitants of very northern regions, to whom it supplies their chief fuel and the material with which they stuff their beds. Its seeds furnish food for the ptarmigan.

Fossil forms of birch are found in the Cretaceous rocks of Greenland and in the Tertiaries of Europe and North America. See Plate of BAMBOO, ETC.

BIRCH, HARVEY A character in *The Spy*, a novel of the American Revolution, by Cooper.

BIRCH, SAMUEL (1813-85). An English antiquarian, Keeper of the Oriental Antiquities in the British Museum. He was born in London, Nov. 3, 1813, the grandson of Samuel Birch, Lord Mayor of London in 1814, and the son of the Rev. Samuel Birch, rector of St. Mary Woolnoth, London. He received his education at the Merchant Tailors' School and in 1832 entered the service of the Commissioners of Public Records. In 1836 he accepted an appointment as an assistant at the British Museum and in 1844 became Assistant Keeper of Antiquities in that institution. In 1861 he was advanced to the position of Keeper of Oriental, British, and Medieval Antiquities. When, in 1866, these departments were divided, Birch was made Keeper of the Oriental Department. He died Dec. 27, 1885.

Birch was a man of varied attainments. During his connection with the British Museum he devoted much attention to classical and British antiquities and to numismatics. Among his works on these subjects are his *Catalogue of Greek and Etruscan Vases in the British Museum*, published in 1851 with the collaboration of Mr. Newton, and his *History of Ancient Pottery* (2 vols.), published in 1858. He also wrote a number of papers for the *Numismatic Chronicle* and for *Archæologia*. In early life he was a zealous student of Chinese, and in later years he wrote some translations from that language. Among these, his *Chinese Widow*, published in 1862, is well known. He was also proficient in other Oriental languages, but it is upon his work as an Egyptologist that Birch's reputation chiefly rests. As early as 1838 he published his *Explanation of the Hieroglyphics on the Coffin of Mycerinus*, and some of the most important Egyptological publications of the British Museum were issued under his editorial supervision. Among these are *Select Papyri in the Hieratic Character* (1841-60), *Inscriptions in the Hieratic and*

Demotic Character (1868), *The Rhind Papyrus* (1866), and *Facsimile of an Egyptian Hieratic Papyrus* (1876). In 1867 Birch enriched Bunsen's work, *Egypt's Place in Universal History*, by the addition of a valuable volume (vol. v) containing the first Egyptian dictionary since that of Champollion, and the first translation of the Book of the Dead, and in 1878 he edited the revised edition of Wilkinson's *Manners and Customs of the Ancient Egyptians*. Birch was a most prolific writer, especially upon Egyptological subjects, and his articles in the *Proceedings of the Society of Literature*, *Revue archéologique*, *Zeitschrift für ägyptische Sprache*, and other periodicals, are very numerous. He was one of the founders of *Records of the Past* (1873 ff.), and many of his translations of Egyptian texts appeared in this series. He was also one of the founders of the Society of Biblical Archaeology and was a frequent contributor to the *Transactions* and to the *Proceedings* of the Society. For his untiring industry, and his boldness in exploring untried fields of research, Birch's reputation as an Egyptologist stands deservedly high. The best sketch of his life and work is to be found in *Transactions of the Society of Biblical Archaeology*, vol. ix (London, 1893).

BIRCH, THOMAS (1705-66). An English historian, born at Clerkenwell. He took orders in the Church of England in 1731, held a benefice in Essex in 1732, and in 1734 became chaplain to the Earl of Kilmarnock, who was beheaded in 1746. He was then (1746) appointed rector of St. Margaret Pattens, London, and in 1752 was one of the secretaries of the Royal Society, a history of which he published (4 vols., 1756-57). His first literary undertaking was *The General Dictionary, Historical and Critical* (10 vols., 1734-41), founded on Bayle's celebrated work. He next edited the State papers of Thurloe, secretary to Oliver Cromwell (7 vols., 1742). Among his other works are *Life of the Hon. Robert Boyle* (1744), *Inquiry into the Share which King Charles I. Had in the Transactions of the Earl of Glamorgan* (1747), *Historical View of the Negotiation Between the Courts of England, France, and Brussels, 1592 to 1617* (1749), *Life of Tilloston* (1752), *Memoirs of the Reign of Queen Elizabeth* (2 vols., 1754), and he edited the works of Sir Walter Raleigh and of Bacon.

BIRCH-PFEIFFER, BIRCH-PFIFTER, CHARLOTTE (1800-68). A German actress and playwright, born in Stuttgart. She made her debut in Munich at the age of 13 and played with great success in Berlin, Vienna, Hamburg, St. Petersburg, Pesth, Amsterdam, and other places. In 1825 she married Dr. Christian Birch of Copenhagen. She managed the theatre in Zurich from 1837 to 1843, and then, after visiting professionally most of the cities in Germany, made an engagement with the Royal Theatre in Berlin, which continued until her death. Her plays, although of no high artistic merit, showed true dramatic talent and a thorough knowledge of stage effects and met with popular success throughout Germany. Most of her plays were dramatizations of popular novels. The following were especially successful: *Pfefferkorn*, *Ilanko*; *Die Günstlinge*, probably her best; *Der Glöckner von Notre Dame*, after Victor Hugo; *Die Frau in Weiss*, after W. Collins, and *Die Waise von Lowood*, after Charlotte Brontë's *Jane Eyre*. Her *Gesammelte Novellen und Erzählungen* (3 vols.) were published in 1863-65.

BIRD (origin obscure) Birds are warm-blooded vertebrate animals clothed with feathers and normally capable of flight. They comprise the class *Aves*. They have existed since early Mesozoic times, exhibit an interesting evolution within very compact and well-defined limits, dwell in every part of the globe, are exceedingly diverse in size, form, ability, and appearance, adapted to every sort of climate and food, show mental qualities of a high order, are of great importance in their economic relations with man, and in most cases are beautiful in outline and color and possessed of melodious voices.

The Bird's Place in Nature. Birds are classified between the reptiles, regarded as inferior to them, and the mammals, regarded as superior in general organization. Birds differ from mammals, broadly, in being clothed with feathers instead of hair, and in the absence of milk glands, and by sundry differences in anatomy and methods of existence, such as the hatching externally of eggs, and the devotion of the fore limbs to flight. They differ from reptiles in having a covering of feathers instead of scales, a complete double circulation of warm blood, no more than three digits in the manus, long legs, etc.

Affinity with Reptiles.—The differences last noted are, however, of much less importance than those which separate them from mammals, and the structural resemblance is so close that some anatomists, notably Huxley, have included reptiles and birds in a single group, the *Sauropsida*, comparable to *Fishes* or *Mammals*, and completing, with them, the three divisions of the *Vertebrata*. This grouping was founded upon the fact that birds and reptiles were alike in being oviparous or ovoviviparous, in having a cloaca, in the incompleteness of the diaphragm, and of a corpus callosum in the brain, in having only one occipital condyle, in the presence of a movable quadrate bone and other peculiarities of the skull, and in the fact that the ankle joint is between two sets of tarsal bones. The close relationship thus implied has been confirmed by the disclosures of paleontology, which show that birds have a reptilian ancestry and are an offshoot of the same stock as modern reptiles.

Development of the Class.—For details of the geological evidence of the origin and evolution of birds, the reader is referred to the articles **BIRD**, **FOSSIL**, **EVOLUTION**. It will suffice here to sum up the matter as Prof. A. Newton, following Furbinger, does in his *Dictionary of Birds* (London, 1893-96). Birds, since they spring from reptiles, must have begun with toothed forms of small or moderate size, with long tails and four lizard-like feet, having well-formed claws, while their bodies were clothed with a very primitive sort of down. To them succeeded forms wherein down developed into feathers, and the fore and hind limbs differed in build—the former becoming organs of prehension (as is still the case in some young birds), and the latter the chief instruments of progression. Then followed a dinosaur-like transformation of the pelvis and legs, and a gradual coalescence of the ankle bones, enabling birds more and more to walk erect. These early reptilian birds were flightless and terrestrial, or at most climbed trees. "Among those which possessed this habit, the bef Feathering (which as yet had, like the hair of mammals, served only for warmth) presumably entered upon a higher step, the feathers becoming larger on certain parts of

the body, particularly on the fore limbs and tail, so as to begin to act as a parachute and allow of a safe gliding descent from a height. By successive increase in the stiffness and size of the feathers, and corresponding modification and strengthening of the skeleton and muscles, the possibility of incipient but real flight was afforded." Thus far this explanation of primitive bird formation is theoretical, but at this point comes confirmatory evidence in the fossil remains of *Archæopteryx* (*q.v.*)—an actual bird with real feathers and apparently considerable power of flight, that lived at the beginning of Secondary or Mesozoic time. "The faculty of flight, thus acquired, went on improving. The remiges grew stronger and stronger and in proportion as the fore limbs specialized into highly developed wings the tail shortened and was consolidated, the posterior vertebrae becoming united as a pygostyle. Thus originated the higher or better 'Birds of Flight'. This type was established in the Cretaceous *Ichthyornis*, and includes the vast majority of existing birds commonly grouped as *Carniatae* (i.e., with a keeled breastbone—not *Ratitæ*), but these only in later times developed their various higher modifications, which were rendered possible by the saving of material and weight." It is important, however, to bear in mind that all birds did not reach the highest degree of faculty in flight. "Many stopped, as it were, halfway," to continue Newton's summary of Furbinger's conclusions, "when a retrogression of the power already attained took place, or, if the power were reached, it could not be maintained—an easy life and absence of rivalry inducing an increased bulk of the body, until the utmost exertion of muscular strength could no longer sustain it in the air. Thus when this retrograde movement began, occasion was afforded for the dwindling away of the volant power, and hence arose the different types which are commonly grouped as *Ratitæ* (*ostriches*, etc.)."

From recent discoveries it seems probable that the primitive group of reptiles known as *Pseudosuchians* is ancestral to the birds. These show close affinities with the dinosaurs or at least with the *Theiopoda*. For a long time one or the other of the dinosaurs was regarded as close to the avian ancestor, and the resemblance of the pelvis and hind limb in the two groups lent weight to this. Huxley, Marsh, and Cope all favored this view. Others were more strongly impressed by the apparent avian characters to be seen in the skeleton of *Pterodactyls*, and especially in the very close resemblance of the brain. Osborn, while recognizing the affinities to both groups, and especially to the dinosaurs, believed that the birds and the dinosaurs had a common ancestor in the Permian. The *Pseudosuchians* are a group immediately ancestral to the theropodous dinosaurs, antedating the characters which are too specialized in the dinosaurs to be directly in a line with avian descent. The bird pelvis may well have evolved from a type like that of *Ornithosuchus* by the pelvis turning farther back.

Following out this line of theory it would seem that the birds' ancestor was a hopping animal before it flew, and that the metatarsus became early strengthened to support the weight of the body entirely on the hind feet. Such a creature could easily have become arboreal and developed a wing from a four-toed hand.

External Features Though a strictly scientific arrangement might call for the more basal internal structure to be first considered, it suits present purposes better to give first an account of the exterior—the plumage and epidermal appendages so characteristic of birds.

Plumage—Feathers are horny products of the epidermal cells of the skin, but very different from mammalian hairs or reptilian scales. Scales, in the herpetological sense, are pieces of the skin itself, originating as folds of the cuticle, and hairs arise from involution pockets in the skin, whereas feathers are produced from papillae of the cuticle. They grow so as to form a coat over the whole body, called plumage. (For the structure and characteristics of a feather considered alone, see FEATHER, for the peculiarities of their growth in "tracts," see PTERYLOSIS, and for the periodical loss and renewal of plumage, see MOLTING.) The origin of plumage can only be surmised. It may well have been that chance variation which marked the earliest divergence from a reptilian stock toward the bird type. It has been conjectured that the primitive plumage was in the form of down, and the probability of this is shown in the fact that at present infant birds are first clothed with down alone. In a large class of birds mostly of low organization, this down is assumed before the embryo leaves the egg, such are called *Dasypteres*, and as most of them are sufficiently advanced to begin at once to run about and pick up a living without parental help, they are said to be *pre-cocial*, and their parents classed as *Procees*. Among the higher birds, as a rule, however, the young are quite naked when hatched, and are termed *Gymnopes* (or *Psilopes*), and these birds are spoken of as *al-tricial* (*Altrices*), because they must feed and care for the young.

Origin and Service of Plumage—The first and essential service of the feathers is as a coat, protecting the body against cold and atmospheric changes. In the view of Prof. O. C. Marsh, who did more than any one else to collect and reason upon the facts of the origin and development of birds, the acquirement and gradual increase of the feather coat was accompanied by a steadily augmented warmth of blood, and a proportional increase in its activity. The greater activity would result in a more perfect circulation, and this in a steady improvement of general bodily ability and power. If this view be correct, to the acquirement of plumage may be attributed the high degree of development attained in modern birds as a class. The second great service of plumage is its development, on wings and tail, into an instrument of flight. (For the phenomena of flying, see FLIGHT.)

Wings and their Functions—Wings, externally viewed, are formed of large quill or flight feathers (*remiges*), which grow from the posterior margin of the arms and hands in a plane (when outstretched) horizontal with the long axis of the body, they overlap one another at the outer edge so as to slide much beneath one another when the wing is closed, form an aeroplane when distended and quiet, and a series of oars when the bird moves. It is believed that in the development of the wings (Gadow, *Proceedings Zoological Society of London*, 1888, p. 665) and powers of flight in birds, those feathers nearest the body were the first to become serviceable; but now the most important *remiges* are those near the outer margin of the wing. These

form a set (usually 10, but in some groups 9, and in a few cases 11), which spring from the bones of the hand and are called *primaries*, they are long and comparatively narrow, and the shaft is near to the anterior margin. Inside these, springing from the ulna, is a set of lesser and more equally proportioned quills called *secondaries*, or better, *cubitals*, these are variable in number, the humming bird having only 6, while the albatross has 40. The fleshy parts of the wing are covered with rows of feathers called *coverts*, which gradually diminish into the general "scapular" plumage upon and overlying the shoulder. Wing feathers vary in length, strength, and shape, according to the mode of life and power of flight in different birds, and there is consequently great variety among birds in respect to the relative size, shape, and power of the wings themselves. The extreme of length, both absolutely and relatively, is found among the oceanic birds, whose lives may be said to be spent upon the wing. The albatross and the condor have wings two and one-half times the total length of the body, reaching an alar expanse of between 11 and 12 feet in large specimens, and nearly the same proportions hold for other pelagic wanderers, as the tropic birds, while in such birds as swifts and hummers the wing may largely exceed the body length. Such wings belong to birds which range over vast spaces of ocean, or remain poised for long periods in the upper air, as do the vultures and diurnal hawks, or that feed upon flying insects, and so have need of extraordinary sustaining power, endurance, and ability for occasional extreme speed and agility. Such wings are always slender, and sabre-like in outline, when extended, the primaries being usually much longer than the secondaries, narrow and curved, but very strong and far overlapped, those of the diurnal birds of prey are peculiarly narrowed, or "whittled away" on the inner vane toward the tip. From this extreme, wings grade down in shape to the "round" or "shot" type characterizing the terrestrial and arboreal birds generally, or those which seek their food in limited areas of quiet water. Here the wing may be considerably shorter than the body, and its feathers broad, the primaries little, if at all, exceeding the secondaries in length—all broadly and evenly vaned, so that the breadth of the wing approaches its length. Such are adapted to quick starting and short, agile "flitting" flights, rather than to prolonged sustentation or swift darting, yet they do not lack power, for many short-winged birds make journeys of hundreds of miles without resting (see MIGRATION), and others are capable of extremely swift motion, but none of them can soar, as do sea birds and birds of prey, nor equal these in volant grace. All these, moreover, trust for safety rather to hiding than to fleeing from danger.

Degeneration of Wings and Flight Power—There is, then, a close relation between the form of wings and the habits of their owner, so far as these involve flight. Hence it might be expected that birds which for any reason diminished or were prevented the use of their wings would find these gradually reduced in utility. Thus, as a matter of fact, has happened. As has already been intimated, there is every probability that the ratite birds (ostriches, cassowaries, and various forms recently extinct) began to be affected in this feature early in the history of the class, and that their present flightless and

almost wingless condition, now most extreme in the apteryx (qv), is due to degeneration of these organs, following the acquirement of cursorial habits in treeless regions. The same result came about differently in another direction, where the penguins, developing by untoward circumstances of competition in the Antarctic region, and forced to get their food wholly from the sea, have had their wings utterly metamorphosed from flight organs into swimming organs. The related auks of the Arctic regions have continued to find use for their wings and have retained them in fair condition, but these include an example of how this kind of degeneration of an organ may come about in a species whose home is so restricted and peculiar (perhaps in freedom from natural enemies) that little or no call is made for exercise of the wings—such circumstances as might surround a bird or breed of birds on any of many small and nearly barren islands. The great auk or gareful (*Plautus impennis*), although somewhat more free than in the case supposed, seems to have degenerated to its wingless condition in such a way, and another, more pertinent example is the weka (qv) of Tistan d'Acunha, which, otherwise little different from a gallinule, is entirely flightless. Several other instances might be adduced, and the fact that the dodo, dinornis, and other extinct flightless birds were inhabitants of islands strengthens the thesis. See FLIGHTLESS BIRDS.

Secondary Uses of Wings—Wings have other uses than for flight. They seem to have been organs for climbing before they were organs for flying, and immature birds of several sorts (see HOATZIN) still use them in scrambling about branches or through the reeds or over rough ground. They enable many water birds to dive and swim, by motions under water analogous to flying. They form hiding places and shelters for the young. "As a hen gathereth her chickens under her wings" was an expression chosen in Holy Writ to enforce the idea of supreme protection. Spread above the nest, they shield the eggs or tender fledglings from rain and hot sunshine. They serve as weapons also, for many birds strike with them very effectively, as our barnyard turkeys show, and in certain forms, as the jacana, chahua (see SCREAMER), and the spui-winged goose, the outer edge of the wing is furnished with one or more spurs which are highly effective as weapons. As a means of expression of the emotions, especially in the nuptial season, wings are utilized in many ways by these highly emotional animals. They are curiously developed, and are fluttered, elevated or spread, or beaten against the body or upon the air, or clapped together over the back, to make drumming or crackling sounds indicative of excitement, and serving as signals or challenges. In some cases certain parts of the wings are modified, as is the case in the snipe (qv), where some of the outermost primaries are shaped so as to make a distinctively audible noise in flight (when desired) known as bleating, and still more strangely in the case of certain manakins. In color, wings are likely to be plain—at least so far as the quill feathers are concerned. The proudly displayed wing colors of the sun bittorn (see Plate of BUSTARDS) is one of a few exceptions. Ordinarily there are bars of white, and in the case of the ducks a brilliant metallic "speculum," and the linings of wings are often more beautiful than the outside. Fre-

quently, however, there are present other sexual characters, more or less transitory, in the form of elongated plumes, as in the aiguis pheasant, the standard-wing (see Plate of NIGHTJARS), and some of the birds of paradise (qv). These belong to the male alone and may or may not be permanent. Their explanation and history come under the domain of "sexual selection" (see NATURAL SELECTION). Lastly, wings seem to offer the privacy and darkness grateful to tired nature, for a bird desiring to sleep usually "tucks its head under its wing."

The Tail—The tail, like the wings, presents great variety as to form and serves sundry purposes. It may be invisible, as in the apteryx, a downy tuft, as in the dodo, very short, broad and stiff, or very long, flexible and narrow, plain and simple or highly ornate. Like the wings, it is composed of large quill feathers called rectrices, the insertion of which is concealed by under and upper coverts, either of which may sometimes be transformed into highly ornamental plumes. The tail feathers grow in pairs, the reason for which arrangement is shown by Archaeopteryx, where each vertebra of the lizard-like tail supported one on each side. The reduction of this long caudal skeleton to a pygostyle, and the consequent crowding of the feathers upon a short base, seems to have produced the modern fan-shaped tail. "The normal number of rectrices is 6 pairs, but a few birds possess 10 or 11, several 9, 8, or 7, many only 5, and Crotaphaga (ams) only 4—the diminution being brought about by the suppression of the outer pair or pairs." The main purpose of the tail, which is capable of much movement, is to assist the bird to balance, check, and guide itself. There seems, however, to be no relation between the size and shape of the tail and the character of the wings, though its shape is pretty constant within each order. Thus most of the sea birds, waterfowl, waders, and game birds have short, compact, inconspicuous tails, until we come to the pheasants, where they are likely to be exceedingly long and showy. The pigeons and their allies have broad tails, and those of the birds of prey are stout and square. The picarian families are mostly possessed of tails which are long or strikingly colored, as notably in the trogons and some cuckoos, or marked with peculiarities of form, as in the motmots, or are the subject of special ornamentation, as among the humming birds. In the great tribe of Passeres the utmost variety exists, the magnificent lyre bird (see Plate of LYRE BIRD, etc.) coming next to the bob-tailed pittas, and here, among the short-tailed finches, warblers, and thrushes, are found birds capable of such caudal displays as those of the paradise birds, sunbirds, some jays, etc. This shows that the essential service of the tail in flight may be performed by an appendage of almost any shape, and that the conspicuous, flexible, and somewhat unimportant nature of the organ has caused it to be influenced by natural (and especially by sexual) selection in an unusual degree as a means of displaying sexual ornamentation and emotion. This is the explanation of the possession by male pheasants of their magnificent trains, of the gorgeous array spread by the peacock (though here it is really the tail coverts), of the symmetrical beauty of the lyre bird's tail, and of the amazing caudal ornaments of birds of paradise (See Plates of PEACOCKS, LYRE BIRDS, BIRDS OF PARADISE). "The motmot," remarks F. M.

Chapman (see MORRIS, for interesting details), "gesticulates with its tail in a remarkable manner, swinging it from side to side, so that it suggests the pendulum of a clock, or sweeping it about in circles with a movement which reminds one of a bandmaster flourishing his baton. We shall find in other species, also, that the tail, more than any other organ, is used to express emotion. Recall its twitching and wagging how it is nervously spread or 'jetted,' showing the white outer feathers, as in the meadow lark. The tail may be also expressive of disposition. Compare the drooped tail of a pensive flycatcher with the uplifted member of an inquisitive wren."

Crests, Combs, etc.—Crests in very great variety, usually able to be elevated or depressed at the will of the bird, and ornamental plumes or tufts of feathers, such as the aigrettes (see AIGRETTE) of herons, and the "tassels" hanging from the turkey's breast, are developments of the plumage that might properly be discussed here, but the limitations of space compel a reference instead to the biographies of the various birds that exhibit them. The beak and head appendages, such as combs, wattles, carunculated ceres, "helmets," etc., are, however, dermal growths, which require mention, as also will the coverings of the feet.

The Beak.—The beak or bill of a bird is formed of two horny sheaths, overlying bony supports, and forming the mouth and food-getting organ of a bird. It consists of two mandibles, an upper and a lower, into which the foremost bones of the skull are produced, all appearance of lips being lost. It is not furnished with proper teeth, although rudiments of them have been observed in the embryos of some parrots, and the marginal laminae with which the bills of many waterfowl are furnished partake of the same character, being secreted by distinct pulps. The resemblance of these marginal laminae to teeth is particularly marked in the merganser (qv). The bills of birds differ much according to their different habits, and particularly according to the kind of food on which they are destined to live, and the manner in which they are to seek it. In birds of prey the beak is strong, the upper mandible arched or hooked, and very sharp, the edges sharp, often notched, and the whole beak adapted for seizing animals, and tearing and cutting to pieces their flesh. A powerful, short, hooked beak, sharp-edged and notched, indicates the greatest courage and adaptation to preying on living animals. The beak of the vulture is longer and weaker than that of the eagle or falcon. In birds which feed on insects and vegetable substances the hooked form of the beak is less common, though well marked in parrots, those birds which catch insects on the wing, such as the nightjars, swifts, etc., are remarkable for the deep division of the beak, and their consequently wide gape, and an analogous provision to facilitate the taking of prey is to be observed in herons, kingfishers, and other fishing birds, but the object is attained in their case by the elongation of the beak, whereas birds which catch insects on the wing have the beak very short. Birds which feed chiefly on seeds have the beak short and strong, for bruising them, while the beak of insectivorous birds is comparatively slender.

Many aquatic birds have broad, comparatively soft and sensitive bills, with laminae on the inner margin for straining the mud from which

much of their food is to be extracted, other birds, as snipes, avocets, etc., seeking their food also in mud, have slender bills of remarkable sensibility. As the varieties of form roughly distinguished the larger and more obvious of the groups of birds, the bill was made the standard for the early classifications, giving such group names as Dentirosities, Conirostices, etc., no longer of scientific value. The modifications of form are very numerous, and the peculiarities of the bills of toucans, hornbills, spoonbills, crossbills, parrots, humming birds, etc., are very interesting, and intimately connected with habits. Some of the modifications, however, are sexual and transitory, such as the knob on the beak of the white pelican, and the deciduous parts of that of the puffin. At the base of the upper mandible a portion of the beak is covered with a membrane, called the *cere* (Lat. *cera*, wax, from the waxy appearance which it presents in some falcons, etc.), which in many birds is naked, in others is feathered, and frequently is covered with hairs or bristles. The nostrils are situated in the upper mandible, usually in the cere, but in some birds they are comparatively far forward, and in some, as puffins, they are very small and placed so near the edge of the mandible as not to be easily detected. They are more or less open, or covered with membrane, or protected by hairs or feathers. Besides their principal use for seizing and dividing or triturating food, the bills of birds are employed in a variety of functions, as dressing or preening the feathers, constructing nests, etc. They are also the principal instruments used by birds in their combats.

The Feet.—The feet of birds vary considerably, according to their mode of life. In some the claws are strong and hooked, in others short, straight, and weak, in some the toes are all separate, in others more or less connected, in birds especially adapted for swimming they are generally *scabbled* or united by a membrane, in other swimming birds, however, a membrane extends only along the sides of each toe. A large group of birds, including woodpeckers, parrots, etc., have two toes before, opposed by two behind, the foot being thus particularly adapted to grasping irregular surfaces and facilitating climbing. These distinctions were seized upon by the early ornithologists as a means of classification, which gave us such obsolete group names as Scansores, Rasores, etc., which only partly coincide with the more scientific groupings now accepted. In most birds the tibia is feathered to the heel joint, in some, however, and particularly in *waders*, the lower part of it is bare, the shank and toes are generally destitute of feathers, and are covered with scaly skin, and the arrangement of these scales has been much studied. "The most primitive form of the horny covering of the feet," according to Stejneger, "seems to be its division into uniform hexagonal scales, and is called reticulate, the next stage is when some of these scales fuse together, forming what are termed scuta, or scutella, still further specialization is indicated by the tarsal scuta fusing into a continuous covering, which, in its extreme development, embraces both the front and the back of the tarsus, as in some of the higher groups of passerine birds, such a tarsus is said to be 'booted.'" Feet, like beaks, have certain accessory or changeable parts, thus in the grouse family there is a seasonal molting of the sheaths of the claws. The most important appendage, however, is the spur or series of

spurs, which arm the "heels" of certain gallinaceous cock birds, and form serviceable weapons among this class, whose beaks are ill adapted to use as weapons, so that they strike with feet and wings in their combats. The extraordinary development of the legs and feet in ratite birds will be found described under *MOA*, *OSTRICH*, and similar titles.

Oil Gland—The skin of birds has no sudoriferous or sebaceous glands, but on the rump at the base of the tail (on the "pope's nose") is a bilobed gland containing oily matter, which is present in all birds except the Ratitæ, bustards, and a few others. This secretion seems useful only for cleaning the plumage, and the bird squeezes a little out upon its beak before preening its feathers. In the oilbird the secretion is excessive, and that of the hoopoe has a very disagreeable odor.

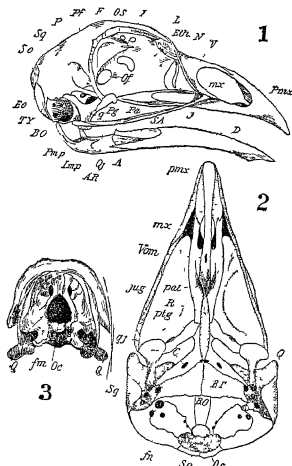
Internal Structure *Skeleton*—The theory and facts of ancestry related above are enforced by comparative anatomy, which finds in the structure of birds a close resemblance to the internal structure of reptiles. Birds, nevertheless, possess distinctive anatomical features fully entitling them to rank as a separate class. In general form the body is spindle-shaped, tapering forward from the shoulders to the head, with the feathers sloping backward, and again diminishing toward the tail, this is adaptive to progress through the thin media of air and water inhabited by birds, and the weight is thrown forward, securing proper balance for the normally horizontal position. In order to secure this there is a concentration of muscles and other organs in the region below the point of suspension of the wings. Not only are the fleshy portions of the legs mainly confined to the upper portions of these limbs, but the muscles which elevate the wings are actually placed on the under instead of the upper surface of the body.

Though the neck is sometimes much prolonged, the body is very compact and rigid. The backbone consists of vertebrae having (typically) saddle-shaped, articular facets, and many processes and ligaments which lock them firmly together, moreover, the vertebrae of the back generally become ankylosed or firmly united together by cementing bone, the solidity thus acquired being for the support of the ribs, and these also are proportionately stronger than is usual in mammals, each of them is provided in the middle with a flattened bony process, directed obliquely backward to the next rib, so that they support one another, and they often become ossified with the sternum, giving unusual rigidity and strength to the thoracic framework. The hinder part of the spine is consolidated with the pelvis, and the tail, primitively long, has become shortened into a few small movable vertebrae terminating in a short and generally much elevated bone, consisting of ankylosed vertebrae, called the pygostyle, or plowshare bone.

In contrast to the general stiffness of the vertebral column in the trunk, it is remarkable for great flexibility in the neck, enabling a bird to make ready use of its bill, or to bring its head into such positions as suit the adjustment of the centre of gravity in flying, standing, etc., there are also certain peculiar ligamentous bands, by which birds can retain the neck in the customary S-curve without muscular exertion. The first (atlas) and second (axis) vertebrae are modified to form an articulation with the head, which is completed by a single globular condyle

(as in reptiles), forming a sort of pivot, and enabling the head to be turned around with a freedom and to an extent impossible to the mammalia, and the fact that it is formed almost wholly by the basioccipital bone constitutes a fundamental distinction between birds and the reptiles on one side and the mammals on the other.

The Skull—The skull is formed of bones corresponding with those of man, but they can be distinguished only when the bird is very young, soon becoming consolidated together. The brain case "is more arched and spacious, and is larger in proportion to the face, than in any reptalia" except pterodactyls. The jaws are much elongated, so as to form the bill, the outward shape of which, however, formed by the



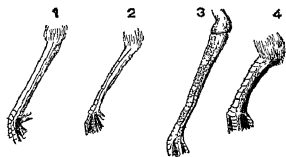
BONES OF THE SKULL OF A FOWL

1 Side view, 2 Lower surface and palate (the lower jaw having been removed), 3 Rear, or occipital, aspect. *Sq*, supra-occipital, *Sq*, squamosal, *Oc*, occipital condyle, *P*, parietal, *Pf*, postfrontal, *F*, frontal, *OS*, orbitosphenoid, *I*, inter-orbital septum, *Etc*, ethmoid, *L*, lacrimal, *N*, nasal, *V*, vomer, *max*, maxilla, *Pmx*, premaxilla, *Q*, optio foramen, *Q*, quadrate, *Po*, pterygoid, *Pa*, palatine, *R*, rostrum, *J*, jugal, *Q*, quadrate, *Bo*, basioccipital (lateral occipital), *TY*, tympanic cavity, *EO*, basi-occipital, *Pmp*, posterior mandibular process, *I m p*, internal mandibular process, *AR*, articular, *A*, angular, *SA*, supra-angular, *D*, dentary, *C*, choana (one of the pair of inner nasal openings), *BT*, basi-temporal, *fm*, foramina for cerebral nerves.

horny sheath, may be very different from that of its bony supports, in adaptation to habits of use. The upper mandible is formed anteriorly and mainly of the premaxilla, and posteriorly by the paired maxillaries and other bones, varying greatly in relative position and importance, and in many birds movable, so that the upper jaw is capable of a certain amount of up and down motion as on a hinge. These and other elements form a palate, the varying bony arrangement of which has been used with disputed success as a basis for general classification in or-

mythology The lower jaw is formed of several elements now fused solidly together, and it is connected with the skull by the quadriates and other lesser bones and by a series of elastic cartilages permitting extreme movability and large expansion of the gape

Legs—The limbs of birds conform to the vertebrate type, with certain modifications, which are least in the hinder pair They are attached to the "pelvic arch," which in birds consists of some solidified sacral and coxycal vertebrae and the paired pelvic bones (ilium, ischium, and os pubis), which latter meet to form a cup in which rests the head of the femur When one con-



TARSAL ENVELOPES

- 1 Booted 2 Scutellate 3 Reticulate
4 Reticulate-scutellate

siders how far behind the centre of gravity of a bird's body the hip joint is placed, and how it must sustain the whole weight of the body under unfavorable circumstances, as well as provide for the leverage of the muscles of the thigh, the necessity for this consolidation, breadth, and massiveness will be perceived The thigh is short, and concealed within the body, the next division, often mistaken for the thigh, is the leg, strictly so called, or *tibia* and *fibula*, which ends at what is really the ankle joint, although popularly regarded as the knee, and beneath this is the shank, commonly called the *tarsus*, which in some birds is very long, serving as a part not of the foot, but of the leg, and formed by a compound bone, composed of the united metatarsal bones, with the upper end of which four tarsal bones are fused Thus the ankle joint is not between the tarsus and metatarsus, but between two series of tarsal bones The tibia is therefore properly a tibiotarsus, and the so-called tarsus is really a tarsometatarsus The feet are divided into toes, which are four in number, three before and one behind, differing from each other in length and in the number of joints or phalanges of which they are composed, the hallux, which is directed backward, being in general comparatively short, and consisting of two joints only No fifth toe is known, and the hallux (first toe) is absent in the Stuthiones, which have lost also the second, while the fourth is diminished, throwing the work almost alone upon the third, or middle toe

Wings and Shoulder Girdle—The anterior limbs or wings of a bird are the fore limbs of other vertebrates modified for the purposes of flight They are attached to the shoulder girdle or pectoral arch of the skeleton, which in this class is of extraordinary strength and importance It consists of the thoracic case formed by the dorsal vertebrae, the true ribs and the breastbones (sternum), which are connected by ligaments and ossifications All the bones of birds are dense and hard The sternum is remarkably large and strong, serving for the at-

tachment of the muscles which depress the wings It generally exhibits a projecting ridge, or keel, along the middle, which is proportionately largest in birds of most powerful flight or swimming ability, and is wanting only in the flightless birds (see above) This plate ossifies only as the bird matures, being in early life a cartilage, the flexibility of which may easily be felt in young fowls, affording housekeepers a test for alleged "spring" chickens The variations in form of the sternum are of considerable taxonomic significance Outside and attached to this case on each side, at a point as high and forward of the centre of gravity as feasible, is the framework of the shoulder joint, biased against the tremendous leverage of the wings It consists of the scapula, or shoulder blade, a coracoid, and a clavicle, the junction of which forms a cup in which rests the head of the humerus The scapula is a more or less sabre-shaped bone placed above the ribs, and lying parallel to the spine, imbedded in muscles and firmly attached (sometimes fused) at the forward extremity to the head of the coracoid The coracoid is a pillar-like bone which serves as the main support of the shoulder, "for while at one extremity it sustains the wing, at the opposite end it is firmly united to the front of the sternum A third brace is afforded by the combined clavicles, which curve downward and backward from the shoulder joint, imbedded in muscles, and unite under the neck, and just in advance of the sternum, to form the furculum (fork), which we know as the "wishbone," and the English call "merrythought." See FOLKLORE

The wing bones are homologous with those of the arm in other vertebrates, but have become modified in both form and relative position to adapt them to the requirements of flight "The fore limb of a bird, when in a state of rest," says Huxley, "exhibits a great change of position if it be compared with that of an ordinary reptile, and the change is of a character similar to, but in some respects greater than, that which the arm of a man presents, when compared with the fore limb of a quadruped mammal The humerus lies parallel with the axis of the body, its proper ventral surface looking outward The forearm is in a position midway between pronation and supination, and the manus is bent back upon the ulnar side of the forearm, in a position not of flexion, but of adduction"

The humerus is usually short as compared with the radius and ulna (the latter is more curved and stouter than the former) which together form the forearm and main stretch of the visible wing, these remain separate, and at their outer extremities articulate with the two small bones of the wrist (carpus) which alone remain free The other, distal, carpal bones, "fuse in the embryo with the proximal end of the three first metacarpals, and all trace of their originally separate existence disappears" The metacarpus consists of three bones (I, II, III), which are more or less flattened and fused The first bears the pollex or "thumb" (whence springs, in some birds, the bastard wing or alula), and the second the index finger, which is long, straight, and has two, or sometimes three, phalanges These bones complete the wing, except that a few species have a rudimentary third finger Archaeopteryx, however, had three well-developed fingers, all armed with claws, and in embryo ostriches a claw sometimes appears on the third

finger. Such is the bony framework of the wings, operated by muscles of immense power (the pectoral muscles are said to make about one-fourteenth of the weight of the whole body in birds of prey, and one-eleventh in a wild goose), but their usefulness depends upon the external furniture of feathers, heretofore described, which forms the expanse necessary for buoyancy and flight (see following paragraph).

Muscular System. The muscles of birds conform, in general, with the vertebrate type, though the homologies, especially about the fore limbs, are sometimes obscure. For these homologies Newton's review in Bronn's *Thier-Reich* (Vogel, pp. 9-325) is complete, and is epitomized in the former's *Dictionary of Birds*, pp. 602-620. Specified arrangements of muscles and tendons, especially the plantar tendons, have been much experimented with as a basis of classification, but the results have not proved of great value when taken alone. Only a few general considerations need be presented here. The muscular system of birds is characterized by an extraordinary strength in those parts concerned with activity and endurance and has certain interesting automatic functions. Thus the vast pectoral muscles attached by a broad fleshy base to the sternum and narrowing to a complicated tendinous attachment to the wing bones, are mainly two, forming the thick whitish "breast" of edible fowls, they depress the wing—the effective movement in flight. An elastic band in front of the wing passes from the head of the humerus to the carpal joint, when the wing is extended, it is stretched about three times its ordinary length, and its natural contraction enables the bird to keep the wing closed without effort. As it lies just beneath the skin, it is easily cut, and as such a severance prevents the wing from being firmly extended, it offers the best method of rendering captive birds incapable of flight, to disable one wing is quite enough. See **MUSCULAR SYSTEM, EVOLUTION OF**.

"In the hind limb of most birds there is a singular extensor muscle, which arises from the pubis, ends in a tendon which passes to the outer side of the knee joint, and terminates in the leg by uniting with the flexor digitorum perforatus. The result of this arrangement is, that the toes are flexed whenever the leg is bent upon the thigh, and, consequently, the roosting bird is held fast upon his perch by the weight of his own body" (Huxley, *Anatomy of Vertebrated Animals*, New York, 1878).

Visceral System. The digestive apparatus of birds resembles that of mammals, exhibiting, however, various modifications, according to the different kinds of food—some birds feeding on flesh, others on fish, others exclusively on insects, others on seeds, others more indiscriminately on a variety of animal and vegetable substances. Few birds masticate their food in any degree, upon being swallowed, it enters the crop or *gizzard*, an enlargement of the oesophagus situated just before the breastbone, where it is moistened by saliva and partly digested, so that its contents, easily regurgitated, form a suitable food for nestlings in some families, as, notably, the pigeons. The crop is wanting in the ostrich, and also generally in birds that feed on fish, and is of greatest size in those of which the food consists of seeds or grain. It is generally single, and on one side of the gullet, sometimes, as in pigeons, it is double. A second dilatation of the oesophagus, called the *proventriculus*, is gen-

erally largest in those birds in which the crop is wanting or small, and in this the food is further softened and chemically treated. The third and principal stomach is the *gizzard* (*gizzard*), which in birds of prey, fish-eating birds, etc., is a mere membranous sac, but in birds which feed on grain or seeds is very thick and muscular, so that it acts as a sort of mill and with extraordinary power. In these birds, also, the grinding down of the contents of the gizzard is assisted by the small rough pebbles or grains of sand constantly swallowed, as is well exemplified in domestic fowls. The liver and pancreas are usually large, as also are the kidneys, but there is no urinary bladder, and the urine, which contains very little water, is at once poured into the cloaca, an enlargement of the terminal portion of the intestine. The intestine varies greatly in capacity and length, being "short" in all purely frugivorous and insectivorous birds, and "long" in those which live upon fishes, carrion, grain, and grass, its walls differ in structure from the mammalian and agree with the reptilian type. The diaphragm is incomplete and differently arranged from that of mammals. See **ALIMENTARY SYSTEM, EVOLUTION OF**.

Food.—The amount of food required to sustain the high temperature and great bodily activity of birds is excessive, when compared with that required by other animals of proportionate size, and young, growing birds tax the food-getting abilities of their parents to the utmost. Many facts might be quoted in support of this, such as that of Aughey's confined plovers, which ate an average of 200 locusts and similar large insects each day, fledglings habitually consume more than their own weight of food between sunrise and sunset—sometimes twice as much. Adult birds eat almost continuously, and digestion is extremely rapid, the process being completed in from one to two hours in small birds. This ability for enormous consumption makes the birds of vast value to man in the reduction of insect pests, it also limits the time birds may fast, so that, unless they can fly with very great rapidity, long journeys cannot be undertaken, and the fact that most birds are able to make great speed is probably an achievement of natural selection related to this very characteristic. On the other hand, birds show considerable ability to adopt a new diet and adapt themselves to it healthfully. The writings of Dr. F. E. L. Beal, Prof. S. A. Forbes, and others, published in the documents of the United States Department of Agriculture, and by the governments of Illinois and other States, contain much information on this subject.

Respiration in Birds is rapid and copious, and the pulmonary system includes not only a pair of rather large lungs, but a system of "air sacs" by which air is distributed throughout the body. These air sacs are of two kinds. One consists of membranous expansions of the lungs, which lie among the tissues in the form of inflatable bags controlled by muscles, so that they can be emptied and filled at the will of the bird, they occur in all parts of the body and penetrate beneath the skin and inside many bones, but in varying amount. It is popularly believed that all bird bones are hollow, but this is far from true. "Generally, the skeleton is most pneumatic in large birds that fly well, like vultures, storks, swans, and pelicans, less so in small birds, and least in heavy or little-flying water birds. However, there are many excep-

tions While, for instance, most of the bones of many Passeres, of swifts, divers, rails, the kiwi, and of terns, are solid, and air cells are restricted chiefly to the cranium, many parts of the skeleton of the large *Ratites* are very pneumatic. The greatest development of pneumatic cells exists in the screamers and hornbills, in which even the fingers and toes, in fact, any part of the skeleton, are hollow. It is well known that a bird which has its humerus shattered by shot can for some time breathe, although its beak and nostrils be tightly closed, and thus be submitted to unnecessary, excruciating pain. Compression of the thorax and abdomen suffocates a wounded bird better than strangulation." See **RESPIRATORY SYSTEM, EVOLUTION OF, ANIMAL HEAT**

The functions of these air sacs are not very evident. They serve to ventilate the rather incontractile lungs, and from them issues the air which inflates the "drums" in the neck of the prairie chicken, the gular pouches of the adjutant stork, the "horn" of the bellbird (*qv*), and that extraordinary swelling of the throat which marks excitement in the pectoral sandpiper (see Colored Plate of **SOUND BIRDS**). These inflations are characteristics of male birds only and appear only in the spring. The air sacs also assist in furnishing a continuous current of air enabling some singing birds to maintain a long strain of melody, such as the nightingales.

Arterial Circulation.—Conformably with this copious aeration, and the habits of activity, the circulation of the blood in birds is rapid, the heart beating 120 times a minute at rest, and nearly doubling this rate at the first stroke of the wings, and its temperature (from 100° to 112° F.) is considerably higher than in mammals. The heart resembles that of the mammalia in its form and structure, but the right ventricle, instead of a mere membranous valve, is furnished with a strong muscle to impel the blood with greater force into the lungs, and the carotid arteries are peculiar. During incubation there is a congestion of blood in the enormously dilated vessels of the abdominal wall, forming the

"brood organ." The red corpuscles are, on the average, twice as large as those of man, and elongated, as in reptiles, rather than round, as in most mammals. See **CIRCULATORY SYSTEM, EVOLUTION OF**

Reproductive System.—Birds are distinctly male and female, cock and hen. The females possess a pair of ovaries (of which only the left one is functional as a rule) situated in the "small of the back" at the front end of the kidney. The ovary consists of a grape-like cluster of germinal eggs, which during the breeding season exhibit all stages of size and ripeness, but in winter are reabsorbed, so that the determination of sex by dissection at that season is difficult. The ripe egg passes down tubular passages (oviducts) in which it receives, in certain "uterine" expansions, its coverings of albumen and shell, to the right side of the rectum, and thence is voided in a more or less advanced state of development, which is completed by incubation or its equivalent. The testes of the male are a pair of glands, situated as are the ovaries, from which the spermatic ducts lead to the cloaca. (See **Egg and EMBRYOLOGY**). All birds lay eggs, some only one, others as many as 20, the number seeming to depend upon the average chances of reaching sexual maturity possessed by each species. With rare exceptions, these eggs are cared for by the parents, and all birds of higher organization prepare receptacles (nests) for them, and furnish by brooding the continuous warmth necessary to their hatching—a process which requires from two to six weeks according to size and other factors. This necessity has developed a body of instincts, habits, and mental and structural characteristics, which include the most striking, significant, and interesting facts of bird life and history. See **NIDIFICATION**

Nervous System. The nervous system of birds is highly developed, but presents few salient differences from the vertebrate type. There is a perceptible improvement of the brain over that of reptiles, more especially in the increased proportional development of the cerebral hemispheres, but the surface convolutions and other

ANATOMY OF BIRDS

- 1 Limbs, as related to the general skeleton. *Scap*, scapula, *hu*, humerus, *cor*, coracoid, *r*, radius, *ca*, carpus, *di*, distals, *met*, metacarpus, *st*, sternum, *kl*, keel of sternum, *ul*, ulna, *py*, pyrostyle, *fa*, femur, *fi*, fibula, *t*, tibiotarsus, *tm*, tarsometatarsus.
- 2 Vertebrae of the tail and ploverbone bones (pyrostyle).
- 3 Shoulder girdle and carinate sternum. *Pa* (a), furculum or "wishbone" (clavicles), *g*, glenoid cavity for humerus, *Scap*, scapula, *v*, vertebral portion of rib, *s*, sternal portion of rib, *un*, *p*, uncinate process, *Cor*, coracoid, *t*, articulation of coracoid with sternum, *st*, sternum, *kl*, keel (carina) of sternum.
- 4 Non-carinate sternum (of a ratite bird). *Co*, *cp*, coracoid grooves, *alp*, *alp*, lateral processes of anterior end, *pe*, posterior end, *kl*, position of keel.
- 5 Side view of the right side of the pelvis of an adult fowl. *Il*, ilium, *is*, ischium, *Ps*, pubis, *dl*, dorso-lumbar vertebrae, *Ca*, caudal vertebrae, *Ac*, acetabulum, with its perforated floor, *P*, pyrostyle.
- 6 Wing of a fowl, embryo (x) and adult (y). *R*, radius, *U*, ulna, *r*, radial carpal, *u*, ulnar carpal, *cd*, *d*, distal carpal, *M*, *1*, *2*, *3*, *4*, metacarpals, *Ph*, phalanges. This exhibits coalescence of bones with age.
- 7 Viscera (of a duck). *T*, trachea, ending below in syrinx (see Fig. 14). *H*, heart, *p*, portion of anterior wall of the body cavity, *Co*, *thg*, coraco-thoracic ligament, *P*, axillary sac (lying between the coracoid, scapula, and the anterior ribs, and communicating with the sub-bronchial air sacs), *S*, sub-clavicular muscle, *Lg*, lung, *Cor*, coracoid, *Pa*, pectoral artery, *Pa*, pectoral vein, *Pul*, pulmonary artery, ***, point of entrance of bronchi into lungs, *S*, *S*, partition walls between the anterior intermediate air sacs, *St*, *St*, partition walls between anterior and posterior intermediate air sacs, *Ant*, anterior intermediate air sacs, *Post*, posterior intermediate air sacs, *Fos*, fibrous oblique septum, *P*, pectoralis major, *F*, furcula, *Stg*, suspensory

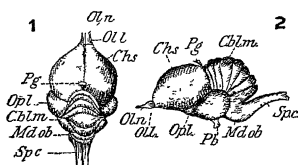
- falciform ligament, *rcl*, right coronary ligament of the liver, *lcl*, left coronary ligament of the liver, *rAdd*, right abdominal posterior air sac, *lAdd*, left ditto, *Co*, oesophagus, *Aa*, innominate artery, and *Va*, innominate vein, with their branches.
- 8 Convoluted windpipe (of an ibis). *W*, windpipe (trachea), *Fu*, furculum, *Cor*, coracoid, *rb*, right bronchus, *lb*, left bronchus, *St*, sternum.
- 9 Alimentary canal (of a fowl). *a*, oesophagus, *sm*, crop, *pr*, proventriculus, *gt*, gizzard, *d*, duodenum, *sm*, lower part of small intestine, *in*, intestinal caeca, *r*, rectum, *cl*, cloaca, *l*, liver, *bl*, gall bladder, *p*, pancreas, *u*, ureters, *ov*, left ovary (the right ovary is rudimentary).
- 10 Muscles of the wing (of a goose). *B*, biceps, *Elast*, *Sec*, vinculum elasticum, *Exp*, *sec*, expander secundarium, *Lig*, ligament, *Mpt*, metapatagium, *Peet*, pectoral muscle ("breast"), *Prop*, propatagium, *Pl*, *lp*, and *Pl* *br*, long and short propatagials, *Tr*, troiceps.
- 11 Muscles of the leg. *Glut* 2, glutens maximus, *Glut* 3, glutens medius, *Glut* 4, glutens minimus, *Glut* *ant*, glutens anterior, *Vast*, vastus externus and vastus internus, *Obt*, obturator internus, *Crureus*, *crureus*, *Semim*, *semimembranosus*, *Femo*, *caud*, femorocaudal, *Biceps*, biceps femoris, *Ambiens*, ambiens, *Long* *halls*, longus hallucis.
- 12 Structure of the inner ear. *Q*, quadrate bone, *Pter*, right pterygoid, *F*, *for*, foramen magnum, *Ca*, occipital condyle, *L*, lagena, *Co*, columella auris, *H*, horizontal semicircular canal, *S*, sagittal semicircular canal.
- 13 Section across the nasal channel of a bird's beak.
- 14 Typical form of a bronchial syrinx in *Passerina* *irrus*, *a*, front view, *b*, side view, showing position of external tympanic membranes, *cl*, tracheo-clavicular muscles.
- 15 Plantar tendons (*Passerina* type). *fp*, flexor peronaeus, dividing to 2d, 3d, and 4th toes, *fh*, flexor hallucis.

[illegible]

features that play so important a part in the brains of the higher mammals are absent or merely indicated. In this, and in the way the cerebral nerves originate, the brain remains nearly reptilian. The sympathetic system is

them, apart from the guidance of touch and smell. Odors affect birds also, but to a less degree probably than is frequent among even reptiles, not to say mammals, and it is probable that even the carrion-eating species depend little upon their sense of smell in guiding them even to odoriferous food. Birds owe less to the sense of touch than many other creatures, for they have few tactile organs, the bristles about their beaks having other purposes, mainly. The bills of some mud-hunting species, however, are specialized in this direction (see DUCK and SNIFE). In respect to hearing, birds are well endowed, having the internal apparatus of the ear (see EAR) highly perfected, and exposed to the vibrations of the air through a cartilaginous meatus with a fairly wide opening. One function of the ears of birds, as well as of other creatures, seems to be to inform the animal as to its relations with space, balance, direction, etc. Whether or not this is to be regarded as a sense, is undecided. There is no external ear, the nearest approach being in the nocturnal owls (where the organ presents other peculiarities, see OWL), though the so-called "ears" of some of those birds are merely tufts of feathers which have nothing to do with audition. Moreover, this faculty in birds extends beyond mere quick perception of sounds to "the power of distinguishing or understanding" pitch, notes, and melodies, or music, and it has been an important factor in the development of bird singing.

The vocal performances of birds are one of

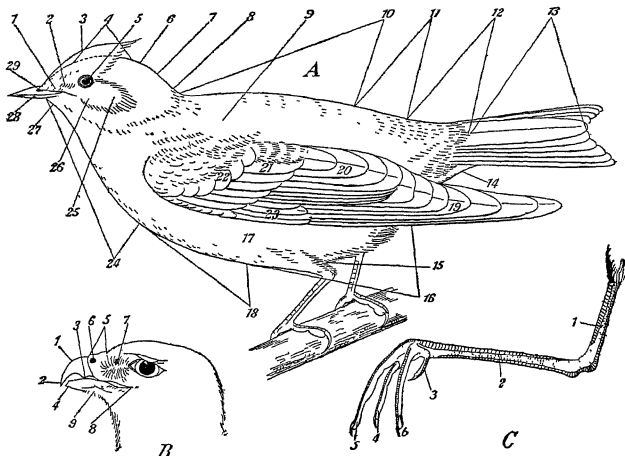


BRAIN OF A PIGEON

1 Dorsal aspect, 2 Lateral aspect. *Oln*, olfactory nerves, *Oll*, olfactory lobe, *Chs*, cerebral hemisphere, *Cblm*, cerebellum, *Pg*, pineal gland, *Opl*, optic lobe, *Mdob*, medulla oblongata, *Spc*, spinal cord, *Pb* pituitary body.

highly developed, as would be expected in creatures of such activity and sensitiveness. See NERVOUS SYSTEM, EVOLUTION OF.

The Senses of Birds, as a whole, equal those of most mammals and in some directions are superior to those of other animals. Taste is, perhaps, feeblest, the horny nature of the jaws and the character of the food not favoring the development of this sense in birds, yet a certain amount of discrimination is undoubtedly exercised by



TOPOGRAPHY OF A BIRD

A General plumage 1, forehead (frons) 2, lore, 3, crest, 4, crown (vertex), 5, eye, 6, hind head (occiput), 7, nape (nucha), 8, hind neck (cervix), 9, interscapular region, 10, back proper (dorsum), including 11, 11, rump (uropygium), 12, lesser tail coverts, 13, tail, 14, under tail coverts (crissum), 15, leg (see C), 16, abdomen, 17, side of body, 18, breast (pectus), 19, primaries, 20, secondaries or cubitals, 21, tertaries or greater coverts, 22, coverts, 23, alula, or bastard wing, 24, throat, the lower half of which is called "jugulum", 25, ear coverts (auriculars), 26, cheek,

or malar region, 27, chin (mentum), 28, beak (see B), 29, nostril.

B Parts of the beak and face 1, culmen (ridge of upper mandible), 2, apex, tip, or hook, 3, tooth on cutting edge of upper mandible, 4, junction (gonys) of ramus of lower mandible, 5, cere, 6, nostril, 7, left lore, 8, corner of mouth (commissure), 9, chin (mentum).

C Parts of the leg 1, thigh (femotarsus), 2, tarsus (metatarsus), 3, first or hind toe (hallux), 4, second or inner toe, 5, third or middle toe, 6, fourth or outer toe.

their foremost and most pleasing characteristics, yet of only a few, in the most highly organized classes, can it be said that they sing. Even in the order called "singers" (Oscines) many make little melody, though, like the crow, they may utter a long list of significant notes—a real language, which is developed among birds generally to a degree realized by few. The vocal mechanism of this class is not in the larynx, but at the lower or pectoral end of the windpipe, in an organ called the syrinx, which consists of several stretched and vibratory membranes, tracheal rings, and controlling muscles. This complicated organ, peculiar to birds, presents almost unlimited modifications, and is quite unlike the arrangement of laryngeal vocal cords in mammals, for the tongue has nothing to do with a bird's speech or music. (See Plate, Figs 7, 8, 14.) Further consideration of the singing of birds leads into the domain of their evolution.

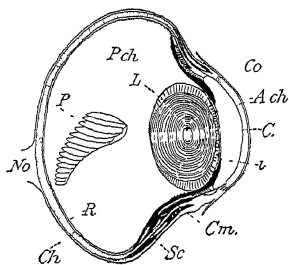
The Eyes of Birds are large, clear, highly perfected in structure, and in many species en-

ocean straight towards small islands or restricted areas of coasts as some birds habitually do in their migrations. See MIGRATION OF ANIMALS.

General Considerations Many aspects of bird life properly belonging to a treatise more extended than this need only be indicated here, because they are elsewhere discussed with reasonable fullness. Thus their classification is outlined under ORNITHOLOGY. The distribution of birds on the globe, where, in spite of their powers of flight, most groups and species are strictly bounded in their range, is sketched under DISTRIBUTION OF ANIMALS. The seasonal movements that characterize most birds outside the tropics, leading them to make more or less extended journeys, along the customary routes, northward in the spring and southward again in the fall, will be found explained under MIGRATION OF ANIMALS. The singing of birds, which forms so conspicuous and enjoyable a feature of their life, is treated elsewhere in this article, and their nest architecture, eggs, care of young, and domestic traits are treated under NIDIFICATION, Egg, etc., while their peculiar colors, ornaments, weapons, economic value, and habits in general, are portrayed in the biographies to be looked for under the names of various species and groups, and in such articles as AGRICULTURE, EVOLUTION, FALCONRY, FOWL, and the like. Birds have also taken a part in the history of mankind's mental and religious development, as appears in the articles AUGURIES AND AUSPICES, FOLKLORE. Finally, many species have been exterminated, directly or indirectly, since mankind came upon the earth, an account of which will be found under EXTINCT ANIMALS.

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STRUCTURE OF THE EYE

Horizontal section. A ch, anterior chamber, Pch, posterior chamber, C, cornea, Ch, choroid, Co, conjunctiva, Cm, Crampton's muscle, L, lens, P, pupil, No, optic nerve, R, retina, Sc, sclerotic coat, with imbedded osseous ring.

dowed with a power of vision which is beyond anything known elsewhere. The way in which vultures descend upon carrion from a height where they are invisible to us, or sea birds swoop down upon fishes, or flycatchers dart long distances upon insects so small we can barely perceive them at close range, are examples of their sharp-sightedness, with which is combined remarkable ability in rapidly changing the focus, as must be necessary to a bird darting swiftly upon prey it must keep constantly in view. Both eyelids are movable, but the lower is much more so than the upper, and in addition to these a third, called the nictitating membrane, is frequently drawn over the eyeball to clean and lubricate it, or shield it from a glare. The owls and other nocturnal birds have great power of contractility not only of the pupil, but of the whole eye. See EYE.

A "Sense" of Direction—The so-called "sixth sense" of orientation or direction, i.e., the power of instinctively knowing and maintaining a course of flight through the air independent of guidance of landmarks, is manifested by birds in a most surprising way, for no other explanation (little as we understand it) seems to account for their ability to cross vast spaces of

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BIRD, FOSSIL Fossil remains that could be referred to birds were among the later acquisitions of paleontologists. The first were mistakenly so considered and consisted of the famous "bird tracks" discovered in the "brown-stone" rocks of the Connecticut River by Hitchcock, about 1835, and extensively studied by him. These footprints may possibly, in a few instances, be traces of primitive animals properly called birds, but so far as known all are impressions made upon mud by dinosaurs and similar amphibians or reptiles of the Triassic Age (See DINOSAURIA, STEGOCERATIA, etc.) More recently true birds have been found fossil from the Jurassic Age onward, but their remains are everywhere comparatively scarce, due mainly to the

easy destructibility of their bodies. The earliest to be identified proved to be also the earliest in time, and consisted of the remains in the Jurassic slates of Bavaria of archæopteryx, whose characteristics are fully described under ARCHÆOPTERYX. This seems to have been a true feather-clothed bird, with well-formed wings, but a long lizard-like tail, beset on each side with a row of horizontal quill feathers, and a heron-like beak studded with teeth. These characteristics are so radically different from those of all other birds that the archæopteryx is classified in a subclass of itself termed Archæornithes, all other birds, fossil and recent, forming another subclass, Neornithes or Euornithes. A long gap in geological time separates the period of the archæopteryx from the next earliest fossil birds known, which belong to the upper, or more recent, part of the Cretaceous Age. These formations in Europe and India, but especially in the western United States, have yielded varied remains of large birds, which, because all have teeth in the beak, have been called Odontornithes or Odontoptes. All are still of a low type of organization, showing many points of genetic affinity with reptiles, but far advanced beyond archæopteryx, and all were aquatic and fish-eating. They approximate, indeed, so closely to the ordinary carinate birds of the present time that they are included with them in a single subclass, as above noted, of which, say Parker and Haswell, "they will constitute a separate series characterized by the possession of teeth and that the two halves of the lower jaw remain completely separate in front, instead of having a solid bony union. Of these toothed birds the one type is known as *Ichthyornis*, and comprises somewhat gull-like birds characterized by having a numerous series of teeth implanted in distinct sockets, and also by the vertebrae or joints of the back articulating with one another by means of cup-like surfaces (instead of saddle-shaped)."

It is quite within the bounds of possibility that these birds may be ancestral types of the modern gulls. With *Hesperornis* (q v) we are confronted with a totally different type, in which the teeth were implanted in an open groove, while the wings were rudimentary and the keel of the breastbone was wanting, although the vertebrae resembled those of existing birds. In general organization, *Hesperornis*, indeed, approximated very closely to the modern divers.

That it was thoroughly aquatic in its habits is self-evident, while it may be regarded as a specialized and flightless offshoot from the ancestral stock of the modern divers. The discovery and elucidation of these Cretaceous toothed birds was made chiefly by Prof. O. C. Marsh, of Yale University, between 1870 and 1880, and his novelties included a large number of skeletons or fragments which have been referred to various genera and are preserved in the Yale Museum at New Haven. "They afford a most valuable contribution in favor of the doctrine of evolution, approximating more and more, as we descend in the geological scale, to reptiles, from which it may be confidently stated the avian class has originated."

With the closing of the Cretaceous Period toothed birds seem to have disappeared, for bird fossils from the early formation of Tertiary Age lack them, and in general approach closely to modern types. Few of these fossils have been found in North America, but Europe and South America have supplied many genera and species

of various groups, increasing in numbers as we rise in the geologic scale. Among the oldest (Eocene) were certain gigantic forms, characterized by long, powerful legs and small and apparently useless wings, but especially by "the enormous and ponderous structure of the skull, which is quite unlike that of any recent bird, and seems out of all proportion to the limbs, gigantic as are some of the leg bones." These have been combined into a group (*Stecorornithes*) including many species, chiefly of the genera *Brontornis* and *Phororhacos*, from the Miocene of Patagonia. "*Brontornis*, for example," according to Lucas, "had leg bones larger than those of an ox, while the great *Phororhacos*, one of his contemporaries, was not only nearly as large, but quite unique in build. Imagine a bird seven or eight feet in height, from the sole of his big, sharp-clawed feet to the top of his huge head, poise this head on a neck as thick as that of a horse, arm it with a beak as sharp as an ice pick and almost as formidable, and you have a fair idea of this feathered giant of the ancient pampas." The skull equaled in size that of a large horse, but whether this great equipment was used for carnivorous purposes can only be conjectured. The general affinity of these huge birds seems to be with the herons, and with them have been classed *Gastornis* and certain other large forms of contemporary time in Europe and North America, whose habits are supposed to be those of cursorial birds of prey. Other birds of the early Tertiary Age represented the *Steganopodes* (q v), or were similar to gulls, penguins, cranes, kingfishers, game birds, and many other modern types. The rocks and caves of the Paris basin and of central France and the Eocene beds of Wyoming have been particularly fruitful in ornitholites. The Miocene and Pliocene eras furnish still more fossil forms, among which a large number of genera still exist, showing how early birds arrived at the perfection of their form and adaptation. Lydekker tells us that by far the greater portion of the remains of birds from the still higher Pleistocene rocks seem to be generically if not specifically identical with those now inhabiting the district in which they occur, though their range at that time may have been different from its present extent. To this period, immediately precedent to that in which we live, belong such recently existing races as the moa, epornis, dinornis, etc., but they are treated elsewhere.

Consult Newton, *Dictionary of Birds* (London, 1893-96), *Ossesania fossiles de la Franco* (Paris, 1867-71), Marsh, *Odontornithes* as *Monograph of the Extinct Toothed Birds of North America* (Washington, 1880), Lucas, *Animals of the Past* (New York, 1901), Case, "The Development and Zoological Relations of the Vertebrates Aves-Mammalia," in *The Journal of Geology* (Chicago, 1898), *Journal of Geology*, vol. xxi (Chicago, 1913), Shufeldt, "Review of Fossil Fauna of the Desert Region," *Bulletin of the American Museum of Natural History*, vol. xxxv (New York, 1913). See also, for further references and particulars, BIRD, EXTINCT ANIMALS, ARCHÆOPTERYX, HESPERORNIS, MOA.

BIRD, ARTHUR (1856-) An American musician, born in Cambridge, Mass. After studying in Berlin he went to Canada, but in 1886 he became a resident of Berlin. His compositions comprise a symphony, three suites for orchestra, a serenade for wind instruments,

Puppetance, and various other compositions for the piano, the comic opera *Daphne* (New York, 1897), the ballet *Rubecah!*, and a decimet (for wind instruments), which won the Paderewski prize in 1902.

BIRD, FREDERIC MATYER (1838-1908) An American clergyman, educator, and hymnologist, born in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1857 and the Union Theological Seminary in 1860, and from 1860 to 1867 was a Lutheran minister. In 1868 he took orders in the Protestant Episcopal church, and from 1870 to 1874 was rector at Spottwood, N. J. From 1881 to 1886 he was professor of psychology, Christian evidences, and rhetoric at Lehigh University, and from 1893 to 1898 was editor of *Lippincott's Magazine*. He edited *Charles Wesley Seen in his Finer and Less Familiar Poems* (1867), *The Lutheran Ministerium* (1st ed., 1868, with Dr. B. M. Smucker), and *Songs of the Spirit* (1871, with Bishop Odenheimer), and has written much on hymnology, in which he is considered one of the foremost American authorities. He also published *The Story of our Christianity* (1893).

BIRD, ISABELLA See BISHOP, ISABELLA BIRD.

BIRD, ROBERT MONTGOMERY (1805-54) An American novelist. He was educated as a physician, but practiced little. Turning his attention to literature, he composed three tragedies, *The Gladiator*, *Oralosa*, and *The Broker of Bogotá*. The first suited the dramatic talent of Edwin Forrest and was one of his favorite impersonations. It still yields declamations for schoolboys. Bird's first novel, *Calavar*, appeared in 1834, and was followed by *The Infidel* (1835). Both of these were historical romances with Mexico as their scene and the Spanish Conquest as their background. Then followed *The Hawks of Hawk Hollow*, *Sheppard Lee*, and *Nick of the Woods* (1837). The last is Bird's most popular and important work, the scene being laid in Kentucky near the close of the Revolutionary War, and its motive being the fear and hatred inspired in the backwoodsman by the red man. In other words, Bird sought to counteract the effects of Cooper's idealization of Indian character. Less important books followed, then Bird practically retired from literary work. His literary life was passed mainly in Philadelphia. Consult Trent, *American Literature*, pp. 386, 463, 590 (New York, 1903).

BIRD-CAGE WALK A walk in St. James's Park, London.

BIRDCATCHING See TRAPPING.

BIRD CHERRY A term applied in Great Britain and Europe to *Prunus padus*, a tree bearing its fruits in racemes, and in other respects being a close counterpart of the American chokecherry (*Prunus virginiana*). In America the term "bird cherry" is reserved for *Prunus pennsylvanica*, the wild red cherry, also known as pigeon or pin cherry. *Prunus pennsylvanica*, a tree 30 to 40 feet high, is of little economic importance, being sparingly cultivated for ornamental purposes, it is occasionally used as a stock for the orchard cherry, and its bark and fruit are used in making cough mixtures.

BIRDE, **berd**, or **BYRD**, **WILLIAM** (1543-1623) An English ecclesiastical composer. He was educated at Edward VI's Chapel, was appointed organist in Lincoln Cathedral in 1563, and 12 years afterward organist to Queen Elizabeth. He is undoubtedly the greatest of the older English masters not only in the field of

sacred music, but also in that of instrumental music. Fétis calls him the English Palestrina. His works include *Psalmes, Sonets, and Songs of Sadness and Piete* (1588), *Songs of Sundrie Natures*, etc. (2d ed., 1610), two books of *Gradualia* (1607), three masses, and numerous compositions for organ and virginal.

BIRD ISLAND One of the smaller of the Hawaiian Islands.

BIRD ISLANDS See AVES, LOS.

BIRD LICE AND OTHER BIRD PARASITES. See FLEA, LOUSE, MITT, TICK, MALLOPHAGA, ETC.

BIRD LIME See TRAPPING.

BIRD OF PARADISE A member of an Australasian family of Passerine birds, remarkable for ornamental plumes, and so called in free translation of their native name in the Moluccas, meaning 'birds of the gods,' which Buffon transformed into *manucode*. They first became known to Europe by specimens brought by the returning ship of Magellan's expedition in 1522, but their skins had previously circulated in trade in India, Persia, and among the Arabs, being worn in the headdresses of the Janizaries early in the sixteenth century, and they soon began to be imported into Spain and Portugal. In preparing for market the skins (mainly or altogether those of the great bird of paradise) the islanders cut off the legs and sometimes the wings, leaving in place of the latter simply the tufts of orange plumes that spring from beneath them. Thus, although Antonio Pigafetta, in his account of the Magellan voyages, had described them pretty accurately as living birds of ordinary structure, many fables were woven around these mutilated skins and burdened literature for many years, as may be seen by a reference to Aldrovandus and his followers, and a monument remains in the present specific name of the most prominent form, *Paradisea apoda*, the 'footless.' It is a curious circumstance that although first, and for a long time, only known from the Moluccas (where the species sent by the ruler as a present to the King of Portugal was not rediscovered until lately), the paradise birds are most numerous and varied elsewhere, especially in New Guinea and the neighboring islands (particularly Aru) and along the northern margin of Australia, many, however, are confined to limited areas, as a single small island. There are about 50 species forming a part of a family (*Paradisidae*), which is closely related to the crows, and which also contains the Australian riflebirds (qv). The bower birds (qv) were formerly included in this family, but now are generally thought to merit a family of their own, Ptilonorhynchidae.

Birds of paradise vary in size from that of a crow to that of a sparrow, and spend their lives and make their nests—which, as a rule, are of very simple construction—in the forest tree tops. All of them are lively and active, running and hanging about the branches with the clinging agility of woodpeckers, as well as in graceful perching attitudes, and all are more or less gregarious and migratory, moving around, or passing back and forth between certain islands, with changing seasons, in search of food. Their food consists largely of various fruits, but insects, snails, and other things are eaten, this group sharing the omnivorous appetites of the crows and jays. Females and young form little flocks which act together, but the males are less often seen, though betraying their presence by loud,

harsh cries. The plumage of all is remarkably soft and velvety, and pleasing tints everywhere prevail, but there is a constant and great dissimilarity between the sexes, the females and young being dressed in quiet colors and having none of the eccentric and gorgeous plumage which renders the males so conspicuous, and which, if worn by the hens, would betray their presence on the nest and lead to the extermination of the species by its natural enemies, such as monkeys, arboreal birds, and beasts of prey. The marvelous ornamentation of the males seems to have been developed wholly by rivalry in attracting the admiration of the females, and in the courting season assemblages of these magnificent beaus take place upon certain trees, where they display their beauties in a sort of matrimonial mart which the Papuans call dancing parties. "A dozen or twenty full-plumaged male birds," says Wallace, "assemble together, raise up their wings, stretch out their necks, and elevate their exquisite plumes, keeping them in a continual vibration. Between whiles they fly across from branch to branch in a state of great excitement, so that the whole tree is filled with waving plumes in every variety of attitude and motion."

This family, therefore, naturally plays a very important part in the evidence adduced by Darwin, Wallace, and other evolutionists, in support of the theory of sexual selection as a means of developing certain specific and group characteristics. It is at the time of these assemblages at dawn, when the birds are too much engrossed with their "dancing" to be cautious, that the natives secrete themselves in the tree tops and silently shoot them down with blunt-headed arrows, and this and other means have been practiced so assiduously to supply the demand for the plumes by milliners that several species are now actually exterminated, and others are on the point of disappearing. The skins are roughly prepared and cured by smoke, so that they lose a good deal of their brilliancy and delicacy of texture. Few species have been caught alive, or, at any rate, have lived to be carried to Europe, but those which complete their journey in good health live for years and thrive, and some females have even laid eggs in captivity. Only two have reached the United States alive, and are now on exhibition in the New York Zoological Park. Some endure confinement well enough in the tropics and exhibit in their cages an amusing solicitude to keep their trailing finery in perfect order.

It is impossible, in a brief article, to describe the bewildering variety and splendor of these astonishing birds, three of which are shown in the accompanying Colored Plate. The plumage of the males is characterized not only by great brightness, but by a glossy, velvety appearance, a metallic lustre, and a singularly beautiful play of colors. Tufts of feathers generally grow from the shoulders, and these, in some of the kinds, are prolonged so as to cover the wings, in the great emerald bird of paradise (*Paradisea apoda*) the prolongation of these shoulder tufts is so great that they extend far beyond the body and even far beyond the tail. They constitute the magnificent part of the well-known bird-of-paradise plumes, many of which, however, are derived from other related species, as *Paradisea minor*, illustrated in the Plate, they can be erected so as to seem to fall in a shower over the whole bird. A peculiarity of many species

is the presence of very long feathers, which consist almost wholly of the central shaft, with little or no vanes, and which curl and glisten like plant wires. The 12-wired *Seleucidus nigricans* or *ignotus* of New Guinea is a remarkable example of this, here they spring from the flanks, but they may be produced from the tail, wings, or head. The figure of the six-shafted bird of paradise (*Parotia seflata*) in the Plate is another example. Its plumes may be raised and lowered as the bird wills, and D'Alberty gives a long account of how one magnificently burnished male of this kind displayed all his glittering armature, one day, in a forest glade, for the delectation of admiring companions. In recent classifications this species has been placed among the bower birds. Among the smallest of all is the third species illustrated, the king bird of paradise (*Cinnamurus regius*). It measures only about 6½ inches in length, and the prevailing colors are velvety red, with the erectile, fan-like plumes on the sides purplish, tipped with green, and the under parts white, separated from the red throat by a green gorget. Those who wish to acquaint themselves further with these splendid birds, of which Thoreau said, "Nature made them pure feathers to show what she could do in that line," should examine the colored life-size plates in Elliott's *Monograph* of the family, and in Lesson's earlier monograph, entitled *Histoire naturelle des Oiseaux de Paradis et des Epimaques* (Paris, 1835), also the plates of the *Voyage de la Marchese, A. R. Wallace, Malay Archipelago* (New York, 1869), Rothschild's *Paradisæida* in *Tierreich* (Berlin, 1898), Sharpe, *Monograph of the Paradisæida* (London, 1892-98), and the writings of Dr. Guillemard, D'Alberty, Salvadori, Hunstein, and other European explorers of the Papuan Archipelago. For descriptions of new species, eggs, and notes on the various plumages, see the volumes of *Novitates Biologica*, published at Tring, England. A somewhat extended popular account will be found in *Royal Natural History*, vol. III, pp. 329-40 and in Knowlton's *Birds of the World*, pp. 750-770.

BIRD OF PASSAGE See **MIGRATION OF ANIMALS**

BIRD OF PREY Any of the predaceous, flesh eating birds, called in the older classifications Rapaces, Raptores, Accipitres, etc., considered as a group from the point of view of habits rather than of structure. In the past they have been regarded usually as an order divisible into two uncertain groups—Nocturnal and Diurnal—the former including the owls, and the latter the eagles, falcons, buzzard hawks, vultures, etc. Ornithologically they are held by most modern systemists to include the three orders, Strigiformes (owls), Cathartidiformes, or New World vultures, and Accipitriformes, the last embracing all the diurnal falconine and Old World vulturine families, together with the aberrant forms, *Serpentarius* or *Gypogaeus*, the secretary bird (*q v*), and *Pandion*, the ospreys (*q v*).

Characteristics—Agreeing in subsisting by the chase and seizure of living animals, or upon dead flesh which must be torn apart, all of this large group present an organization which combines great power with special tools adapted to their habits. Most of them are masters of the power of flight, the great vultures soaring out of human sight, and the falcons having astonishing dash and quickness. Their wits are alert,

BIRDS OF PARADISE



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|---|--|-----|--------------|
| 1 | PAPUAN BIRD OF PARADISE - PARADISEA MINOR | 1/4 | NATURAL SIZE |
| 2 | KING BIRD OF PARADISE - CINNURUS REGIUS | 1/2 | |
| 3 | SIX SHAFTED BIRD OF PARADISE - PAROTIA SEPLATA | 1/3 | |

and their senses are keen, their eyesight being the most highly developed, perhaps, in the whole animal kingdom. In size they vary from the condor, one of the greatest of all birds, to the finch falcon or pigmy owl, scarcely larger than a sparrow. They are widespread, but far more numerous in warm climates than in cold, few dwelling near the Arctic zone, and while many are migratory, the most of them are permanent residents of the districts they inhabit. Their plumage, as a rule, is plain, black, white, reddish browns, and yellowish tints predominating, nor are crests or ornamental feathers common among them. The female is usually somewhat larger than the male—a fact due, no doubt, to the circumstance that she labors more continuously than her partner in providing food for her young and in defending her home. All the birds of prey are monogamous, and the larger ones are believed to pair for life. Certain nesting sites are resorted to for many generations in succession by eagles, vultures, fishhawks, etc., the nest being annually refitted for occupancy. The nesting sites are very various, ranging from the ledge of a lofty crag, or a tall tree top, to bushes, the ground, or even holes in the ground. The eggs of the owls are always white, but those of other families are usually blotched with color, and they are commonly few in number. "The period of incubation is longer than in most other aerial birds, and the young at first are covered with down, are quite helpless, and for an unusually long time are entirely dependent on the parents." In all species the many indigestible substances, as hair, scales, bones, etc., swallowed, are later ejected from the stomach in pellets called "castings."

Predaceous Equipment.—The birds of prey have acquired an equipment of beak and claws entirely suitable for their work. The beak is large, strong, terminates in a sharp hook, and the edges of the mandible are sharp and more or less serrated, forming an excellent piercing, tearing, and cutting instrument. The base of the upper mandible is sheathed in a membrane, bare of feathers, and often bright yellow in color, through which the nostrils open, and which is called the cere, no other birds have a similar beak except the parrots, which otherwise are very different from this group. In the vultures not only the base of the beak, but the whole head is naked, in adaptation to their carrion-eating habits, involving the constant smearing of the head with filth prejudicial to feather growth. (See **VULTURE**). Instruments for seizing their prey (which includes fish), holding it or carrying it away, are provided in the feet, which are flexible, very strong, and armed with long, sharply pointed and powerful claws, giving a lacerating, catlike grasp, which ordinarily no force available to the victim is able to break. In carrion feeders, however, the feet exhibit little of this power, and the talons are comparatively short and blunt, for they are not called upon to seize and hold a struggling victim. Most of these birds live many years. They are nowhere very numerous in any one district.

Bibliography. Consult books mentioned under **BIRD**, *Fisher, Hawks and Owls of the United States* (Department of Agriculture, Washington, 1893). See **BUZZARD**, **EAGLE**, **FALCON**, **HAWK**, **OWL**, **VULTURE**, with the accompanying plates, and the names of particular birds of prey.

BIRDS, THE. A comedy by Aristophanes (q v).
BIRD'S ELL, WILLIAM WILFRED (1854-1900). An American educator, born at Richmond, Ind. He graduated at Earlham College (Richmond, Ind.) in 1873, and from 1885 to 1893 was instructor in mathematics at the Friends' Central School, Philadelphia, Pa. He was president of Swarthmore College (Swarthmore, Pa.) in 1898-1902, and then became principal of the Girls' High School in Philadelphia. With Rufus M. Jones he edited *Shepp's Literary World* in 1897, and the *Library of American Literature* in 1901.

BIRDSBORO. A borough in Berks Co., Pa., 8 miles (direct) southeast of Reading, on the Philadelphia and Reading and the Pennsylvania railroads (Map Pennsylvania, K 7). It has large foundries and machine shops. Pop., 1890, 2261, 1900, 2264, 1910, 2930.

BIRDS-EYE LIMESTONE. A limestone at the base of the Trenton series in New York State, so called from the white "eyes," cross sections of crystallized corals of the genus *Tetradium*, that appear on the surface of the stone. The rock is usually dove-colored, fine-grained limestone which has, when free from the "eyes," been used for a secondary grade of lithographic stone. The maximum thickness of the formation is 30 feet, and it is exposed on the flanks of the Adirondack Mountains of New York and has been doubtfully recognized in Kentucky. Its characteristic fossil in New York is *Bathyrurus extans*, a trilobite. The name "Birdseye Limestone" has been replaced by the geographic term "Lowville Limestone," which refers to the town of Lowville, N. Y., in the vicinity of which the formation is well developed. See **ORDOVICIAN**.

BIRD'S-FOOT CLOVER (*Ornithopus*). A genus of plants of the family Leguminosae, subfamily Papilionaceae, deriving both its popular and its botanical name from the resemblance of the curved pods to birds' claws. The leaves are pinnate, with a terminal leaflet. One species, *Ornithopus perpusillus*, is a native of Great Britain and central Europe, growing on dry, sandy, or gravelly soils—a small plant of little importance, the flowers of which are white or yellow, striated with red. *Ornithopus sativus* is an important forage plant. See **SERRADELLA**.

BIRD'S-FOOT CLOVER. See **LOTUS**.

BIRDS' NESTS. See **NIDIFICATION**.

BIRDS' NESTS, EIDILE. See **SWIFT**.

BIRDS OF AMERICA, THE. A monumental work by John James Audubon (1827-38), published at a cost of \$100,000 and sold at \$1000 a copy.

BIRDS OF PASSAGE. Five collections of poems, or "Flights," by II. W. Longfellow (q v) (1863-78).

BIRD SPIDER, or BIRDCATCHING SPIDER. A name given to some of the largest spiders, belonging to the family Theraphosidae. Most of them are natives of tropical and subtropical America. The best known is *Mygale* or *Avicularia avicularia* of Brazil, known there as *Aranha caranqueyna*, or 'crab spider'. It is nearly 2 inches long, very hairy, and almost entirely black, its feet, when stretched out, occupy a surface of nearly a foot in diameter. The hooks of its mandibles are strong, conical, and very black. This great spider forms a tube-shaped burrow in sandy soil, widening towards the mouth, sometimes 18 inches deep, and lined with a fine white semitransparent silken tissue, like muslin, at the bottom of which the silken nidus

of eggs is loosely placed. Here the females sit peering out of the trumpet-shaped entrance most of the time, day and night. They are timid, gentle in disposition, and do not bite their captors. No debris is ever found about their burrows to indicate their food. In fact, their prey is not known, nor their manner of taking it, which apparently is never by searching for it or chasing. "We must confess," says the eminent specialist, the Rev F O P Cambridge (*Proc Zool Soc of London*, 1896, p 717), "that we do not know the staple diet. Though I was out night after night, and though I watched, on several occasions, the whole night through, the tunnels of 20 and upward of the sand burrowing 'mygale,' yet not once could I detect a spider in the act of seizing her prey or even venturing beyond the entrance of her burrow."

BIRD TICK See FOREST FLY

BIRD WOOD, SIR GEORGE CHRISTOPHER MOLESWORTH (1832-) An English physician and botanist, born in Belgium, Bombay. He studied at the University of Edinburgh and was in 1854 appointed to the medical staff of the Bombay Establishment of the East India Company. From 1857 to 1869 he was connected with the Grant Medical College of Bombay as professor successively of anatomy and physiology and botany and materia medica. He was also chiefly instrumental in establishing in Bombay the Victoria and Albert Museum and the Victoria Gardens. From 1871 to 1902 he was special assistant in the revenue, statistics, and commerce department of the India Office. He was a learned student of Indian botany. He published in 1862 a *Catalogue of the Economic Vegetable Products of the Bombay Presidency* (1868) and identified the frankincense tree (*Transactions of the Linnean Society*, vol xxvii). His other works include *The Industrial Arts of India* (1888), *The Aryan Flora and Fauna* (in Max Müller's *Biography of Words*, 1888), *Report on the Cultivation of Spanish Chestnuts* (1892), *The First Letter-Book of the (English) East India Company* (1895), *Relics of the East India Company*, with a series of 50 plates, by William Griggs (1909, with William Foster).

BIREJIK, be'ra-jék', or **BIR**, bër (anciently, *Butha*, fortress, stronghold). A town of Asiatic Turkey, in the vilayet of Aleppo, on the east bank of the Euphrates, at the head of navigation (Map Turkey in Asia, H 4). The town, built on a limestone cliff 400 feet high, is surrounded by a strong wall flanked with towers. Its streets are narrow and clean, and it has several mosques with tall minarets, a caravansary, a bazar, and a ruined citadel and castle. Travelers and caravans from Aleppo to Diarbekr, Bagdad, Persia, etc., cross the Euphrates at this point. Pop (est.), 8000. Bir, which signifies 'well,' is a prefix to the names of several smaller towns in Arabia.

BIRET'IA See COSTUME, ECCLESIASTICAL

BIRGE, birj, EDWARD ASAHEL (1851-) An American naturalist. He was born in Troy, N Y, and was educated at Williams College and at Harvard University. He was appointed professor of natural history and zoology at the University of Wisconsin in 1879, dean of the College of Letters and Sciences in 1891, and was acting president of the university from 1900 to 1903. In 1897 he became director of the Geological and Natural History Survey of Wisconsin. He wrote various papers on zoology and

edited the revision of Prof James Orton's *Comparative Zoology* (1882). He became a member of the Board of Forestry Commissioners in Wisconsin in 1905, and a member of the Conservation Commission in 1908.

BIRGE, HENRY WARNER (1825-88). An American soldier, born in Hartford, Conn. At the opening of the Civil War he organized the first State regiment of three-year troops—the Fourth Connecticut Volunteers—in which he was appointed major. After service in Maryland and Virginia he was commissioned colonel of the Thirtieth Connecticut infantry regiment in 1861 and in 1862 was placed in command of the defenses of New Orleans. In December of the latter year he was appointed to the command of a brigade, which he retained through the first Red River campaign and at the siege of Port Hudson. He was raised to the rank of brigadier general in September, 1863, served in the second Red River expedition, and subsequently commanded at Baton Rouge. In 1864 he was assigned to the command of the second division of the Nineteenth Corps. He participated in the battles of General Sheridan's campaign in the Shenandoah valley, and in February and March, 1865, was appointed to the command of the defenses of Savannah. In the same year he resigned, with rank of brevet major general of volunteers.

BIRGER OF BJALBO, bër'gër da byél'bò (?-1266). Regent of Sweden (1250-66), during the minority of his son, Waldemar, the successor of Eric XI. During his regency he passed many beneficent laws, brought over to Christianity the inhabitants of Tavastehus, Finland, whose incursions had frequently desolated Sweden, increased the Swedish possessions in Finland, founded the city of Stockholm, and established important commercial relations with Lübeck and Hamburg.

BIRGIT, BIRGITTA See BRIDGET

BIRGIT'TINES See BRIGITTINES

BIRKBECK, bër'bek, GEORGE (1776-1841). An English physician and educational reformer, born at Settle, Yorkshire. He studied medicine at the universities of Edinburgh and London. At the age of 23 he was appointed professor of philosophy at Anderson's College, Glasgow (now merged in the Glasgow and West of Scotland Technical College), where in 1800 he introduced a course of lectures to workmen. This "mechanics' class" evolved, in 1823, into the Glasgow Mechanics' Institution, which is believed to have been the first institution of its kind. In 1804 he moved to London, where he attained considerable reputation as a physician. In 1824 the London Mechanics' Institution was organized by Dr Birkbeck and was subsequently named in his honor. The success of his educational establishments paved the way for the present system of popular scientific education in England.

BIRKDALE, bër'kdäl. A manufacturing town and railway junction in Lancashire, England, 1½ miles southwest of Southport (Map England, C 3), of which it is a residential section. Pop, 1891, 12,400; 1901, 15,511; 1911, 18,000.

BIRKENFELD, bir'ken-felt (Ger. *Birke*, birch + *Feld*, field, referring to its rich forests). A German principality belonging politically to the Duchy of Oldenburg, but forming an enclave in the Prussian Rheinland adjoining the districts of Coblenz and Treves (Map Germany, B 4). Its area is about 192 square miles. The prin-

pality belongs to the region of the Hochwald and Idar Wald, and its surface is hilly and covered for a large part with forests. The area devoted to agriculture is very limited, and the domestic supply of agricultural products generally falls short of the demand. The chief industry is the polishing of agates, which gives work to about 8000 men. The administration of the principality is vested in a board, consisting of a president and two assistants, responsible to the ministry of Oldenburg, and a council of 15 members. Pop., 1900, 43,406, 1910, 54,465. About 80 per cent of the population is Protestant. In the capital, Birkenfeld, the industries are brewing and tanning, and the manufacture of tobacco and cheese. It contains two churches, a grand-ducal high school, and a hospital. Pop., 1900, 2229.

BIRKENHEAD, bĕrk'en-hĕd. A seaport town and municipal, county, and parliamentary borough in Cheshire, England, situated opposite Liverpool, on the left bank of the Mersey (Map England, C 3). It includes the townships of Cloughton, Oxtan, Tranmere, and part of Higher Bebington. The growth of the town has been very rapid since the opening of its first great dock in 1847, its floating and dry docks now cover an area of over 165 acres. They are, with those of Liverpool, under the management of the Mersey Docks and Harbor Board (See LIVERPOOL). The streets of the town are regularly laid out, and the buildings, as a rule, are substantial. Among the notable buildings are the handsome townhall, the merchants' hall, and the market hall. The educational institutions include St Aidan's Theological College, a school of science and art, and a public library. Birkenhead has for some years been celebrated for its extensive shipbuilding yards, some of the largest iron ships afloat having been built there. The celebrated Confederate cruiser *Alabama* was built here in 1862 by the Messrs Laird, to whose enterprise, more than to that of any other firm, the town owes its present importance. In the neighborhood of the docks are the Canada Works for the construction of gigantic bridges, the Britannia machinery works, and others. Birkenhead has a number of street railway lines, which are owned by the corporation, but leased to private companies. It is connected with Liverpool by three ferries owned by the municipality and netting annually (1909-10) about \$54,000, and by the Mersey Tunnel, opened in 1886. Birkenhead was incorporated in 1577 and received a municipal charter in 1877; it sends one member to Parliament. The town's affairs are administered by a mayor, a municipal council of 40 and a board of aldermen of 14 members (See GREAT BRITAIN, *Local Government*). The town owns its water works, which net an annual profit of about \$26,000. It also owns its gas works and an electric light and power plant, the former netting annually about \$100,000, the latter about \$60,000 (in 1909-10). Refuse is for the most part burned in destructors, the sewage is discharged into the sea. The town maintains public baths, markets (a covered market was erected in 1909 at a cost of about \$50,000), a slaughterhouse, and a cemetery. There are three fine municipal parks. Pop., 1901, 110,926, 1911, 130,832.

BIRKMITRE, bĕrk'mĭr, WILLIAM HARVEY (1860-) An American architectural engineer, born at Philadelphia. After studying architecture for four years with Samuel Sloan

he moved to New York to take charge (1885) of the construction work of the Jackson Architectural Iron Works, and (1892) of the J. F. and J. M. Cornell Iron Works. His plans for steel details include those for such buildings as the Astor hotels, Central Bank Building, Silk Exchange Building, and Lords Court Building (all in New York). He is author of *Architectural Iron and Steel* (1891), *Compound Riveted Girders* (1893), *Skeleton Construction in Buildings* (1893), *The Planning and Construction of American Theatres* (1896), *Construction of High Office Buildings* (1898).

BIRMAH, bĕr'mā. See BURMA.
BIRMINGHAM, bĕr'mĭng am (either AS *Birmingham*, *Becorning*, a proper name + *hām* home, or 'home on the hill by the heath,' from AS *brōm*, broom + *ahh*, descent + *hām* home). A city and a county and parliamentary borough of England, the chief seat of metal manufactures in Great Britain and the leading hardware centre of the world (Map England E 4). It stands near the centre of England, the northwest of Warwickshire, with extension in Staffordshire and Worcestershire, 113 miles by rail northwest of London. It is built on the eastern slopes of three hills at the confluence of the Rea and the Tame, with a gravelly foundation overlying clay and new red sandstone and is one of the best-drained towns in England. The older part of the city is crowded with workshops and warehouses, but the modern portion is well built and possessed of architectural beauty. For the most part the streets are crooked and somewhat narrow, but there are several fine thoroughfares, as New Street, Colmore Row, and Corporation Street, which contain the more important buildings. Among the finer buildings are the council house and art gallery, in Renaissance style, completed in 1881; the townhall, in Greek style, completed in 1850 and the post office—these are at the western end of New Street, the Midland Institute (with fine lecture room) and the Central Library, near the townhall, a school of art, in Colmore Row the enormous New Street Station of the London and Northwestern and Midland railways, the handsome Victoria assize courts (completed 1891) in Corporation Street, and, in New Street, the building of the Royal Society of Artists, the exchange, and the grammar school of King Edward VI. Among ecclesiastical edifices, of which Birmingham is not conspicuous, may be mentioned the Anglican churches of St Martin St Philip, and St Alban, the Unitarian church of the Messiah, a Wesleyan church, and the Roman Catholic cathedral of St Chad.

The central part of Birmingham, the worst overcrowded section before 1876, has been vastly improved since then and has become the best part of the city. This was accomplished by the municipality condemning the district and purchasing it for some \$8,000,000. A considerable income is derived from the leases, and in 1912 the city will come into possession of all the buildings erected on its land. Besides nine parks, of which the chief are Aston Park (to the northeast, Cannon Hill Park on the south and the Botanical Gardens, seven gardens or recreation grounds are distributed over the city.

Birmingham has been at the head of the large progressive cities of England in the work of modernizing its institutions. In 1875 it reorganized its health department, which set itself to work eradicating unsanitary conditions. One

the first tasks was the providing of a pure water supply. Some 3000 polluted wells were closed, to prevent the spreading of zymotic diseases. That, combined with the condemnation of unsanitary houses, the increase of disinfecting facilities, and a rigorous inspection of food supplies, helped to reduce the average death rate from 26 per 1000 to less than 20. In the unsanitary districts the reduction was from 60 and more per 1000 to 25.

With the same purpose in view the city improved its sewage system by providing a modern system of sewage and garbage collection combined with a sewage farm, it erected baths and washhouses, hospitals, asylums, special artisans' dwellings, etc. Most of Birmingham's municipal undertakings date back to 1874-75, when Joseph Chamberlain, as mayor of the town, inaugurated the new era. At that time, also, Birmingham bought out the water company at a cost of more than \$6,000,000. Since then great extensions and improvements have been carried out, and a new supply obtained from the watershed of the rivers Elan and Clearwen, in Wales, some 73 miles from the city, for which more than \$30,000,000 was appropriated. The supply was formally opened by King Edward in 1904. The gathering ground covers 45,562 acres, and the great Caban Coch Dam forms a reservoir of 1,500,000,000 gallons. The gas works were acquired by the city in 1875 for \$10,000,000. Though the price of gas was reduced about 33 per cent, the business yielded a profit to the city. In 1899 the supply of electricity was also municipalized. Free libraries in Birmingham date back to 1860. They consist of a reference library, central circulating library, and nine branch libraries. The city owns the markets and slaughterhouses, which yield a considerable net income, in addition to facilitating the inspection of the food supply of the city. It also owns its street railways, which are operated by private companies, paying a high rental.

As an industrial centre, Birmingham provides many facilities for technical education. In 1895 the Municipal Technical School, in Suffolk Street, was completed, and to it was transferred the scientific department of the Midland Institute. The University of Birmingham, with site at Edgbaston, was chartered in 1899. Into it was merged Mason College (founded 1870), which had already practically absorbed Queen's College (chiefly medical). The city maintains also a school of art, with branches in several of the board schools. The art gallery and museum form an integral part of the art school. The elementary schools are under the control of the school board. The charitable institutions, maintained by endowments, legacies, and donations, comprise the General, Queen's, and Children's hospitals, general dispensary, asylums for lunatics, for the blind, deaf and dumb, sanatorium, and almshouses.

Birmingham is the largest manufacturing town in England after Manchester. It became very early the seat of iron manufactures on account of its proximity to a forest and extensive iron mines. Its principal industry at present is the manufacture of brass and iron and steel products. Its manufactures comprise steam and gas engines, electric motors, hydraulic presses, railway cars, guns, machinery, etc. In addition there are glass works, chemical works, breweries, etc. Women are generally employed in the lighter trades.

Birmingham returns seven members to Parliament. It was created a city in 1889, and the title of lord mayor was conferred on the chief magistrate in 1897. It covers 13,478 acres, divided into 18 wards. The council consists of 18 aldermen and 54 councillors. The corporation is a large landowner and the largest employer of labor in the borough. (See GREAT BRITAIN *Local Government*.) Birmingham is the seat of an American consulate. Like most of the great industrial cities, Birmingham increased rapidly in population during the nineteenth century. In 1501 it had 60,000 inhabitants, in 1901, 523,179, an increase of 770 per cent in a century, and of nearly 22 per cent from 1891 to 1901 (1891 430,000), in 1911, 525,833, the increase over 1901 being only 0.5 per cent. It is the fourth English city in population, being exceeded by Manchester, Liverpool, and London.

History. Birmingham was an old town of the Anglo-Saxons (Beornings Ham). After the Conquest it was ruled by the De Birmingham family till 1527. In mediæval times it was a thriving commercial and industrial place. During the Civil War it was staunchly Puritan and supplied the armies of Parliament with arms. It was plundered and in part burned by Prince Rupert in 1643. Its great commercial importance dates from the seventeenth century, when the restoration of Charles II brought from France a fashionable demand for metal ornaments, which Birmingham supplied with unexampled vigor. In the latter part of the seventeenth century the Birmingham smiths began to manufacture swords and guns. Its hardware manufactures as early as 1727 are said to have supported 50,000 persons. The earliest attempts at cotton spinning by rollers were made in 1736. The opening of the coal and iron fields of Lancashire added greatly to its prosperity, so that in 1745 it was one of the principal inland towns of England. By 1761 its manufactures were known throughout the world. Towards the end of the eighteenth century it was a centre of Liberal agitation, being the home of Priestley. The Reform and Chartist movements had powerful support in the town.

Bibliography. Bunce, *History of the Corporation of Birmingham, with a Sketch of the Earlier Government of the Town* (Birmingham, 1885); Griffith, *History of the Free Schools, Colleges, Hospitals, and Asylums of Birmingham* (London, 1861); Timmins, *The Resources, Products, and Industrial History of Birmingham and the Midland Industrial District* (London, 1866); Shaw, *Municipal Government in Great Britain* (New York, 1895); Jones, *A Short History of Birmingham* (Birmingham, 1911).

BIRMINGHAM. The county seat of Jefferson County and the largest city in Alabama. It is 97 miles north of Montgomery, the capital, and is served by nine railroad systems, several of which have two or more lines entering the city. They are the Southern, Louisville and Nashville, Seaboard Air Line, Illinois Central, Queen and Crescent, Atlanta, Birmingham and Atlantic, Central of Georgia, Birmingham Mineral and Birmingham Southern. Interurban electric lines give extensive connection with near-by cities. Following the discovery of the great deposits of coal, iron ore, and limestone in Jefferson County, Birmingham was laid off by the Elyton Land Company early in 1871 and was named after the iron and steel manufac-

turing city of England. In December of the same year, with a population of about 1000, the town was incorporated. Growth was rapid from the beginning, but in 1873 a terrible cholera epidemic caused the death of scores and drove thousands away. Following 1880 growth again became very rapid, but the panic of the late eighties prostrated business and again caused thousands to leave. Recovery soon began, however, and the maximum growth was from 1900 to 1910, when the population gain was 245 per cent over the figure for the previous decade. While coal mining and iron and steel manufacture of all kinds are the most important industries, the city has great cotton and lumber interests. Birmingham also has cotton factories, automobile factories, cottonseed-oil mills, flour and grain mills, furniture, box, and mattress factories, and numerous smaller industries. It has become a very important point in the South for manufacturer's agents. Because of its mineral products Birmingham's annual railroad tonnage is greater than the total tonnage of the other gulf States. The city has beautiful parks, many miles of well-paved streets, handsome public buildings, and exceptional school facilities. Its Central High School is regarded as a model of its kind. Howard College (Baptist and coeducational) is at East Lake, while Birmingham College (Methodist) is on Owen-Town Heights. Office buildings ranging from 6 to 27 stories in height include the Woodward, First National Bank, Brown-Marx, Empire, Y M C A, Title Guarantee, Chamber of Commerce, Farley, Jefferson County Bank and American Trust. Two hotels, the Tutwiler and Roden, each costing more than \$1,000,000, were erected in 1913. There are two handsome railroad stations—the Louisville and Nashville, and the Terminal, the latter being used by all roads except the Louisville and Nashville and the Atlanta, Birmingham, and Atlantic. The two largest hospitals are St. Vincent's and Hillman, the latter being a charity institution operated by Jefferson County. Since March 31, 1911, Birmingham has been governed by a commission of three, one of whom is elected each year. They are paid \$7500 each per annum. Each has charge of certain features of city administration, and it is claimed the system has been more economical than the aldermanic form of government. The Greater Birmingham law became effective Jan. 1, 1910, under which the following incorporated suburbs became a part of the greater city: Wylam, Eusley, Pratt City, West End, Elyton, North Birmingham, East Birmingham, Avondale, Woodlawn, and East Lake. The city's area is now 50.08 square miles. Birmingham's annual expenditures for administration are well over a million dollars. The city's outstanding bonds amount to \$5,887,000. Pop., 1880, 3086; 1890, 26,178; 1900, 38,415; 1910, 132,685.

BIRMINGHAM, GEORGE A. The pen name of the Rev. J. Owen Hannay (qv).

BIRMINGHAM FESTIVAL. The A periodical musical festival begun in Birmingham, England, in 1768, and given every three years. At one time the programme was made up largely from Handel, and at all times the character of the music has been of the highest order. The custom is in a measure a commemoration of the founding of Dr. Ash's hospital in the town in 1766, and the proceeds are given to the perpetuation of this institution.

BIRNAM, bër'nom. A hill 1324 feet high, in the east of Perthshire, Scotland, near Dunkeld, 12 miles northwest of Perth, commanding a fine view of the valley of the Tay (Map Scotland, E 3). It was formerly covered by part of an ancient royal forest, which Shakespeare has immortalized in his tragedy of *Macbeth*. A village of the same name is situated at less than one mile's distance southeast of Dunkeld.

BIRNBAUMER WALD, bîrn'bôu-mër wald (Ger. *Birnbaum*, pear tree + *Wald*, wood, forest, a translation of the Latin *ad prum*, at the pear tree). A highland of Carniola, near the river Frigidus, northeast of Trieste. Theodosius I (qv) won a victory over Arbogast and Eugenius there in 394. In this highland lay the Roman station *Ad Prum*, on a main road across the Alps to Italy.

BIRNEY, bîr'nî, **DAVID BELL** (1825-64). An American soldier, the son of James G. Birney. He was born in Huntsville, Ala., graduated at Andover, studied law in Cincinnati, and practiced for several years in Philadelphia. He entered the Federal army as lieutenant colonel in the Twenty-third Pennsylvania Infantry, in April, 1861, was raised to the rank of brigadier general of volunteers in February, 1862, served with great gallantry in the Peninsular campaign, distinguishing himself particularly at Yorktown and Williamsburg, and afterward took a conspicuous part in the second battle of Bull Run, and in the battles of Fredericksburg and Chancellorsville. In May, 1863, he became a major general of volunteers and during part of the battle of Gettysburg commanded the Third Army Corps. From May to June, 1864, he commanded a division under Hancock, and rendered efficient services in the battles of the Wilderness and Spotsylvania, and after July of this year he was in command of the Tenth Corps of the Army of the James. He died on Oct. 18, 1864, in Philadelphia, of a fever contracted during this last campaign. Consult vol. iv of the *United Service Magazine* (New York, 1865).

BIRNEY, JAMES GILLESPIE (1792-1857). An American reformer, leader of the conservative Abolitionists during the antislavery struggle. He was born in Danville, Ky., studied at Transylvania University, and graduated at Princeton in 1810. He then studied law under Alexander J. Dallas in Philadelphia, began practice in Danville in 1814, and was elected to the State Legislature two years later. In 1818 he removed to a plantation in the vicinity of Huntsville, Ala., and in the following year served in the Alabama Legislature. He resumed his law practice in Huntsville in 1823, was elected prosecuting attorney there, and soon became the most successful practitioner in northern Alabama, but turned his attention more and more to the study of the slavery question, and in 1832-33 acted as agent of the Colonization Society (qv) for the district embracing Tennessee, Alabama, Mississippi, Louisiana, and Arkansas. In November, 1833, he returned to Danville, Ky., where he freed his own slaves and devoted himself with zeal and energy to the cause of gradual emancipation, though he soon became a convert to immediatism. He organized the Kentucky Antislavery Society in 1835 and in the same year planned an antislavery paper, but, as he was unable to find a publisher in Kentucky, he removed to Cincinnati, Ohio, where, on Jan. 1, 1836, he issued the first number of *The Philanthropist*. During the

next few years his press was several times destroyed by mobs, and he himself was repeatedly threatened with personal violence and death, but in spite of opposition his paper rapidly attained a wide circulation and exerted a powerful influence among those who, like himself, believed in abolition, but opposed the radicalism of Garrison and his followers (See GARRISON, WILLIAM LLOYD) Both as an editor and as a speaker, though firm and unflinching in his advocacy of what he believed to be right, he upheld the Constitution, opposed all violence and fanaticism, and was uniformly courteous, tolerant, and fair. He spent much of his time in making speeches throughout the North, especially before the legislatures of the various States, and in 1837 was elected secretary of the American Antislavery Society. In this capacity he conducted the correspondence of the society, employed its lecturers, and prepared its reports, and, in addition, he continued to make frequent addresses before legislatures and large public assemblies. He soon came to be regarded everywhere as the leader of the "Constitutional" Abolitionists, i. e., of the Abolitionists who opposed all revolutionary measures, fought against secession, and endeavored to effect their desired reforms through the ordinary machinery of government, and both in 1840 and in 1844 he was the unanimous candidate of the Liberty party (q v) for the presidency, receiving 7069 votes in the first election and 62,263 in the second. He was disabled by a fall from his horse in 1845 and passed the last 12 years of his life in retirement as an invalid, first in Bay City, Mich., and afterward in Eagleswood, N. J. Besides numerous brief articles for the press, his chief writings were his *Letter on Colonization* (1834), *American Churches the Bulwarks of American Slavery* (1840), *Speeches in England* (1840), *Examination of the Decision of the United States Supreme Court in the Case of Strader et al vs Graham* (1850). Consult the excellent biography by his son, William Birney, *James G Birney and his Times* (New York, 1890).

BIRNEY, WILLIAM (1819-1907) An American soldier and lawyer, the son of James G Birney. He was born near Huntsville, Ala., was educated at Yale College and in Europe, took an active part in the Revolution of 1848 in France, and for two years was professor of English literature in the college at Bourges. He entered the Federal army at the outbreak of the Civil War, was elected captain, attained the rank of brigadier general of volunteers in May, 1863, and from then until the close of the war was in command of a division. In 1863-64 he served as one of the three superintendents charged with the enlistment of colored troops and in this capacity organized seven regiments. He served with conspicuous gallantry in the battles of Second Bull Run, Chantilly, Fredericksburg, and Chancellorsville, received the brevet rank of major general of volunteers in March, 1865, "for gallant and meritorious services during the war," and resigned in August of the same year. After the war he lived for a time in Florida, but in 1874 removed to Washington and became a practicing attorney. Among his publications are the excellent *Life and Times of James G Birney* (1890) and *A Plea for Intellectual and Spiritual Liberty*.

BIRON, b'ron', ARMAND DE GONTAUT (1524-92) A French soldier. He became grand master of artillery in 1569 and was in command at

the siege of Rochelle and in Guienne. After the assassination of Henry III, who had appointed him marshal in 1576, he was among the first to declare for Henry IV. He brought a part of Normandy under subjection and dissuaded Henry from going into England, distinguished himself in the battles of Arques and Ivry against the League, and was killed by a cannon shot at the siege of Epernay.

BIRON, CHARLES DE GONTAUT, DUKE DE (1562-1602) A French soldier, son of Armand, under whose command he served with distinction in the campaigns against the League, acquiring renown and the surname of "Fulmen Galliae," or "Thunderbolt of France." He was made admiral of France by Henry IV in 1592, and marshal in 1594, became Governor of Burgundy in 1595, and was created duke and peer of France in 1598. He was a man of great intrepidity, but was fickle and treacherous. He was sent to England in 1601 to announce the marriage of Henry with Maria de Medici, but about the same time he was condemned by the Parliament for treasonable negotiations with Spain and Savoy, aiming at the overthrow of the Bourbon dynasty, the dismemberment of the kingdom into provincial states, and his own elevation to the sovereignty of Burgundy. Induced to come to Paris, he was apprehended and beheaded in the Bastille.

BIRON, b'ron, ERNEST JOHN, DUKE OF COURLAND (1690-1772) A Russian statesman. He was the son of a landed proprietor of the name of Buhren. Through Bestuzheff-Ryumin, who befriended him, he obtained the favor of Anna Ivanovna, who was called to the Russian throne in 1730, and he followed her to St. Petersburg, where he soon became chamberlain and practical ruler of the Russian Empire. Rambaud describes him "as a large, handsome man, uneducated, loving only his horses, a superb lackey, morally as evil and vindictive as his mistress." His enemies and rivals were swept out of his way, while the poor people were ground down by taxation. His revengeful severity is said to have exceeded that of his unscrupulous mistress. As an administrator, however, he showed considerable ability, and maintained order in the Empire. The Duchy of Courland, in which Biron was born, was then in dispute between Poland and Russia. Anna conferred the duchy upon Biron, and Russian armies were employed to place on the Polish throne Augustus III, Elector of Saxony, who had promised the investiture of Courland for Biron. The Emperor Charles VI readily countenanced these violent acts, and the King of Prussia was bought by certain territorial concessions. In 1737, therefore, the nobles of Courland were obliged to confirm Anna's appointment, and in 1739 the investiture took place at Warsaw by authority of the Polish King and Senate. The Empress died in October, 1740, and Biron, under her will, assumed the regency in the name of the infant Emperor Ivan VI. Field Marshal Munnich, who during the past reign had supported Biron, but who saw that he was to receive slight recognition now, set on foot a conspiracy, the result of which was the exile of Biron to Pelnin, in Siberia. A second palace revolution occurred soon after, and the new Empress, Elizabeth Petrovna, banished Munnich and permitted Biron to take up his residence at Yaroslavl. After Elizabeth's death his duchy was restored to him by Catharine II. He died Sept. 28, 1772.

Consult Rueli, *Geschichte E. J. von Birons* (1764) Rambaud, *Russia*, vol. 11, Lavisse et Rambaud, *Histoire générale* (Paris, 1893-1901), "Lettres d'Anna Ivanovna," in *L'Archiv Russe*, vols. 11 and 111 (Moscow, 1873-77), and *Les antiquités russes* (Moscow, 1884), Halem, *Lebensbeschreibung des russischen General-Feldmarschalls Münnich* (Oldenburg, 1803)

BIRE, béi See PARSONSTOWN

BIRRELL, Rr HON AUGUSTINE (1850-

) An English chancery barrister, best known as an essayist, born at Wavertree (near Liverpool). He graduated in 1872 at Trinity Hall, Cambridge, and in 1903 was admitted to the bar of the Inner Temple. From 1889 to 1900 he was returned to Parliament as a Liberal member for West Fife and in 1896-99 he was professor of law in University College, London. He became President of the Board of Education in the Campbell-Bannerman cabinet, formed in December, 1905. He was returned in the elections of 1906 as a member of Parliament for Bristol, and in 1907 he became Chief Secretary for Ireland. In 1912 he was installed as Lord Rector of Glasgow University. By his first volume, *Obiter Dicta* (1884), he achieved forthwith a unique place among modern English essayists. His power of analysis, his wit—often epigrammatic—his positive opinions, and his ubanity combine to form a style whose easy art has evoked the word "birrelling." His publications include, further *Obiter Dicta* (2d ser., 1887, a complete edition of *Obiter Dicta* was printed in 1910), "Life of Charlotte Brontë" (1887, in *Great Writers Series*, reissue, 1911), *Res Judicatae* (1892); *Men, Women, and Books* (1894, reissue, 1912), *Lectures on the Duties and Liabilities of Trustees* (1896), an edition (1897) of Boswell's *Life of Johnson*, *Sir Frank Lockwood* (1898), *Seven Lectures on the Law and History of Copyright in Books* (1899), *Collected Essays* (1900), *In the Name of the Bodleian* (1905), *Andrew Marvell* (1906), *A Rogue's Memoirs* (1912), *On a Dictum of M. Disraeli's and Other Matters* (1913)

BIRLT, bért, THODOR (1852-) A German philologist, born in Hamburg. He became professor at Marburg, and is author of numerous monographs, among which are *Das antike Buchwesen in seinem Verhältnis zur Literatur* (Berlin, 1882), *Der Haat bei Plautus* (1901), *Griechische Brünneren eines Reisenden* (1902), and *Die Buchrolle in der Kunst* (Leipzig, 1907). He also edited *Claudiamus* (qv) (Berlin, 1892) and wrote poems and dramas. Under the title *Jugendverse und Heimatpoesie Vergils* (Leipzig, 1910), he edited the "Catalepton," or Minor Poems, of Vergil.

BIRTH (AS *beof, gebýrd*, from *beran*, to bear, cf Ger *Geburt*, birth). At law birth does not take place until the complete separation of the child from its mother and the setting up of its independent system of circulation. The old doctrine of the common law that the child must be heard to cry in order to gain the status of a living person has long been obsolete, more exact and trustworthy methods of establishing the fact having been adopted. Even before birth a child is for many purposes regarded as a living person and may accordingly inherit real property or acquire a *vested* interest under a will or grant of lands. The latter result has been secured by statute in England and generally in the United States (See POSTHUMOUS CHILD). At common law the killing of an un-

born child was not murder, but it has been made so, generally of the grade of manslaughter, by modern statutes. See ABORTION.

In England and many of our States there are elaborate provisions by statute for the compulsory public registration of births. These provisions apply to all children born alive, whether legitimate or illegitimate, but not to such as are stillborn.

Concealment of Birth is a statutory offense, created in England by 21 Jac I, c 27 (1624). That statute provided that if any woman who was delivered of a child which would be a bastard if born alive endeavored to conceal the birth by burying, drowning, or the like, she should suffer death, unless she could prove by at least one witness that the child was born dead. Even Blackstone was forced to admit that this law "savored pretty strongly of severity," and it has been modified from time to time. At present the English statute provides that any person who endeavors to conceal the birth of a child by any secret disposition of its dead body, whether it died before, at, or after its birth, is guilty of a misdemeanor. While the statutes of our States on this subject differ in some respects, most of them are characterized by the milder spirit of the modern English acts. Consult the authorities referred to under MEDICAL JURISPRUDENCE, CRIMINAL LAW.

BIRTH/MARK See NÆVUS

BIRTH/RIGHT A preference in inheritance accorded by law to an heir according to the order of his birth. Such preference may be exclusive, as in the English rule of primogeniture, which gives the entire real estate to the eldest male heir, and in the singular custom of borough English, under which it goes to the youngest son, or it may be proportional, only giving the eldest son, or the youngest, as the case may be, a larger share in the estate than is appropriated to the other heirs. In the latter sense it is used in early Hebrew history. The right, in one or another of these forms, prevailed in all stages of primitive society, though with advancing civilization it has gradually given place to the more equitable principle of an equal division of the property among all the heirs of a given class. Its survival in England is probably due quite as much to the conservative temper of the English people as to the existence of social conditions which tend to perpetuate it. Almost everywhere else, on the continent of Europe as well as in the United States and the colonies of Great Britain, it has completely disappeared. See HEIR, INHERITANCE.

BIRTHS, REGISTRATION OF In European countries the work of recording births was early undertaken by ecclesiastical authorities. As early as 1538 births were recorded by the clergy in England under the form of registration of baptisms. Registration of births was established in Sweden under ecclesiastical law in 1686. Complete statistics have been preserved since 1749. Systematization of birth registration was attained in England by a law of 1837 establishing a Registrar General's office. In 1876 registration of births was made compulsory. On the continent of Europe systems of registration became general by the middle of the nineteenth century.

In the United States the registration of births is required by law in a majority of the States, but adequate administration is confined to the

New England States, Pennsylvania, and Michigan. Even here it is estimated that not more than 90 per cent of the births are recorded. Various organizations, including the Bureau of the Census, the Public Health Service, the American Medical Association, the American Bar Association, and the American Statistical Association, have conducted a propaganda for the proper registration of births. In 1912 a model bill for the registration of births was prepared under the auspices of the Federal Census Bureau, by the Council on Health and Public Instruction of the American Medical Association. It is the purpose of the associations interested to urge upon the legislatures of the various States the enactment of this bill, at least in its essentials, in order to secure a high degree of uniformity in statistics of births.

Originally the chief object of the registration of births was to obviate disputes that might arise with respect to the inheritance of property. This is still an important object, but others of greater importance have arisen. Statistics of infant mortality, which are required as an indication of the need of improvements in sanitation, must obviously remain incomplete so long as the number of births is left to conjecture. It is on this ground that the Children's Bureau, established in 1912, devoted its first public monograph to the subject of *Birth Registration* (Washington, 1913). Almost every State has laws limiting the employment of children under a specified age. Such laws cannot be adequately enforced without an efficient system of recording births. From a social scientific point of view, it is of the greatest importance to ascertain the birth rates of the various classes in the general population. Under present conditions, except for New England, Pennsylvania, and Michigan, such rates can be found only through inferences from the census of population. See VITAL STATISTICS.

BIRTHWORT See ARISTOLOCHIA.

BIRUNI, bî-rû'nî, ABU RÂHMÂN MUHAMMAD IBN AHMED AL (973-1048). An Arabian scholar and author. He was born in Khwarizm and was of Iranian descent. Some time after he had finished his great work *Kitab al Athar al Bakuya*, in 1000 A.D., he moved to India, where he taught the Greek sciences and learned much concerning the civilization of India. Upon his return he took up his residence at Ghazni, Afghanistan, while that city was prominent as the capital of Mahmud and his son Mas'ud, to whom he dedicated his exposition of astronomy. He died at Ghazni. Among his works, translated by C. E. Sachaw, are *Chronology of Ancient Nations* (London, 1879) and *India: An Account of the Religion, Philosophy, Literature, Geography, Chronology, Astronomy, Customs, Laws, and Astrology of India about 1030 A.D.* (London, 1910), and a mathematical treatise translated into German by H. Suter, *Das Buch der Auffindung der Seiber in Bibliotheca Mathematica* (1910).

BIS (Lat twice). In music a term which denotes that the passage over which it is placed is to be played twice, or repeated. Such passages generally have a slur or bow over them, and the word "bis" written below it, thus *bis*.

BISAYA, bî-sî'yâ. See VISAYA.

BISBEE. A city in Cochise Co., Ariz., 82 miles southeast of Tucson, on the El Paso and Southwestern Railroad (Map Arizona, F 6). It contains a public library, two hospitals, and a

country club. Bisbee has important lead, silver, and gold mining interests and is one of the most productive copper regions in the southwest, having a daily output of 7000 tons. Pop., 1910, 9019.

BISBEE, WILLIAM HENRY (1840-) An American soldier, born in Rhode Island. He enlisted as a private in the Eighteenth Infantry at the outbreak of the Civil War and served until its close, especially distinguishing himself at the battles of Murrefreesboro and Jonesboro, Ga., and in the Atlanta campaign. Following the war he served for many years in the West, putting down numerous Indian uprisings and quelling riots. During the Spanish-American War he commanded a regiment and took part in the battles of El Caney and San Juan. From 1899 to 1902 he served in the Philippines, where for a time he commanded a subdistrict and later had command of all the troops north of Manila in the island of Luzon. He retired from active service in 1902, having attained the rank of brigadier general in the preceding year.

BISCACHA, bis-ka'chá. See VIZCACHA.

BISCAY (Sp. *Biscaya*, *Vizcaya*), a Spanish province named after the *Basques*, BAY OF (the Roman *Sinus Aquitanicus*, *Sinus Cantabricus*, *Cantaber Oceanus*, or *Gallicus Oceanus*, and the French *Golfe de Gascogne*, sometimes called also the Cantabrian Sea). A portion of the Atlantic Ocean sweeping in along the northern shores of the Spanish Peninsula in an almost straight line from Cape Ortegal to St Jean de Luz, at the western foot of the Pyrenees, and thence curving along the west shores of France northward to the Pertuis Breton and northward to the island of Ouessant. Its extreme width and length are about 400 miles each. The whole of the south coast is bold and rocky, in some places rising to a height of several hundred feet, and broken by inlets, some of which form safe and commodious harbors. From the mouth of the Adour to the Gironde the shore presents a totally different aspect, being low and sandy, with numerous lagoons, the embouchures of these two rivers forming the only harbors. For 800 miles north of the Gironde the coast is still low, but marshy instead of sandy, and from the peninsula of Quiberon westward it is moderately elevated and rocky in some places. The rivers falling into the bay on the Spanish shores are unimportant. On the coast of France it receives, through the rivers Vilaine, Loire, Charente, Dordogne, and Gironne (the common estuary of these two being the Gironde), and Adour, the waters of about one-half the surface of the whole country. Its chief ports are Gijón, Santander, Bilbao, San Sebastián, and Pasajes in Spain, and Bayonne, Bordeaux, Rochefort, La Rochelle, Nantes, and Lorient in France. Its chief islands, which are all situated north of the Gironde, are Belle-Île, Noirmoutier, Re and Oléron. Navigation is rendered difficult and dangerous by the prevalence of northwest winds and by the existence of the violent Renel's current. The depth of the bay ranges from 100 feet or less along the shore to more than 10,000 feet in the central part. The height to which the tides rise is hardly exceeded anywhere. Consult "Transactions," Linnæan Society of London, series 2, *Zoology* (London, 1904-11).

BISCEGLIE, bî-shâ'lyâ (anciently, Lat *Vesulisa*). A city in the province of Bari, south Italy, on the Adriatic, 21 miles northwest of Bari (Map Italy, L 6). The harbor admits

vessels of small burden only. The principal buildings are the cathedral, two churches, dating from the twelfth century, a dilapidated Norman castle, and the palaces of the old families. In the surrounding country, which produces excellent wine and currants, there are many magnificent villas. During the Crusades Bisceglie was famous for the hospital for pilgrims founded by Bohemond. Its ruins still exist. Pop, 1881, 24,000, 1901, 30,885, 1911, 34,425.

BISCHOF, bish'of, KARL-GUSTAV CHRISTOPH (1792-1870). A German chemist and geologist. He was born in Nuremberg and in 1822 became professor of chemistry and mineralogy at Bonn. He obtained the prize of the Scientific Society of Holland for his treatise on internal terrestrial heat, and published in England, in connection with it, *Researches on the Internal Heat of the Globe* (1841). His chief work, *Lehrbuch der chemischen und physikalischen Geologie* (3d ed, 1863-66), was an important contribution to the study of the physical and chemical problems of geology.

BISCHOF, MARIE. See BRANDT, MARIANNE.

BISCHOFF, JOSEPH EDUARD KONRAD, pen name, Konrad von Bolanden (1828-1910). A German novelist. He was born at Niedergailbach and after studying at the Catholic Theological Seminary at Munich was ordained a priest at Speyer in 1852. Afterward he retired from the ministry to devote his entire attention to literary work, in which he became noted through Catholic Europe. His publications consist of historical novels and romances attacking the Reformation, the political and literary movements of the eighteenth century, and the progress of contemporary science. His best-known works are *Eine Brautfahrt* (1857), *Franz von Sickingen* (1859), *Historische Novellen über Friedrich II von Preussen und seine Zeit* (4 vols, 1865-66), *Angela* (1866), *Gustav Adolf* (1867-70), *Die Bartholomäusnacht* (1879), *Die Sozialdemokraten und ihre Vater* (1894), *Deutsche Kulturbilder* (1893-94), *Otto der Grosse* (1898), *Die Sünde wider den heiligen Geist* (1901), *Megenfried* (1902), *Minnetreue* (1904), *Der neue Gott* (1909), *Satan bei der Arbeit* (1909). Consult article by Keiter, "Konrad von Bolanden," in *Unsere Zeit*, vol 1 (Leipzig, 1876).

BISCHOFF, THEODOR LUDWIG WILHELM (1807-82). A German anatomist and physiologist. He was born in Hanover and became professor of anatomy at Heidelberg in 1836. From Heidelberg he removed, in 1844, to the University of Gießen and in 1855 to that of Munich. He devoted himself especially to embryology, to which he made many contributions. His *Entwicklungsgeschichte des Kammcheneres* (1843) received the prize from the Berlin Academy. Of his numerous writings in Müller's *Archiv*, and published separately, may be singled out the *Beweis der von der Begattung unabhängigen periodischen Reifung und Loslösung der Eier der Säugetiere und des Menschen* (1844), in which he establishes the important doctrine of the periodic ripening and detachment of the ova in mammalia and man, independently of generation. Being called upon in 1850, together with Liebig, to give his opinion in the famous Gorlitz trial (q.v.), which involved the question of the possibility of spontaneous combustion, he took occasion to publish a dissertation on the subject, *Ueber die Selbstverbrennung* (demonstrating the impossibility of spontaneous combustion), which

appeared in Henke's *Zeitschrift für die Staats-ärztliche Kunde* (1850).

BISCUIT (for older *E biscuit*, Fr *biscuit*, twice-baked, from *bis*, twice + *cuire*, to bake, cf Ger *Zweiback*). A kind of hard, dry bread baked in small, thin cakes. In the United States this kind of bread is usually called crackers, the name "biscuits" being applied to small, round, soft cakes made from dough, raised with yeast or baking powder, or sour milk and soda, and usually shortened with lard, etc. Biscuits or crackers are usually made of flour, water, or milk, and salt, to which are added, for special varieties of biscuits, sugar, spices, butter, eggs, dried fruits, etc. There are many varieties of biscuits now made, but practically the same mode of procedure is adopted in making them all. The ingredients are first mixed by machine to form a dough, and this dough is mechanically kneaded, rolled out thin, and cut into squares or disks, which are carried through the ovens on traveling frames or belts, and baked in about 15 minutes. The baked biscuits are next dried for several days, and finally packed in one of a variety of forms for shipment. See BREAD.

BISCUIT. A term applied in pottery to porcelain and other earthenware after the first firing and before it has received the glaze and embellishments. (See PORCELAIN and POTTERY.) In this condition the ware is very porous and allows water very slowly to percolate through its pores.

BISCUIT ROOT. A bulbous plant belonging to the family Liliaceæ. See QUAMASH.

BISE. See BICE.

BISHARIN, bē'shā-rēn' (Ar pl of *Bishar*). The designation of a group of tribes living between the Red Sea, the Nile, and Abyssinia. Properly they form the northern division of the Beja, while the southern members of the group are called Hadendoa. The Bisharin are nomadic herdsmen and are nominally Mohammedans. Those living near the borders of Egypt have the reputation of being sturdy beggars. They present physically a fine Caucasian type, and they speak a highly developed Hamitic language, of which there are grammars by Almqvist (Upsala, 1881-85) and Reinisch (Vienna, 1893). For an account of the Bisharin, consult Munzinger, *Ostafrikanische Studien* (Schaffhausen, 1864).

BISH'OP. The title of the highest order of clergy in the Christian Church. The name is in the Saxon *biscop*, and comes from the Greek *ἐπίσκοπος*, *episkopos*, an overseer, from *ἐπί*, *epi*, upon + *σκοπεῖν*, *skopein*, to watch. The Athenians used to send officers called *ἐπίσκοποι*, *episkopoi*, to their subject states. The word was adopted by the Romans, and Cicero speaks of himself as an *episcopus* in Campania, it was also applied by them to the officers who inspected the provision markets. There are two theories as to the functions of a bishop in the primitive Church, which may be described as the Episcopalian and the Presbyterian theories. The question between them is whether the episcopate is necessary to the very existence of a church or only to its orderly regulation, in other words, to its *esse* or to its *bene esse*.

According to the former, the first bishops in the Church of Christ were his Apostles, "for the office wherunto Matthias was chosen is termed (Acts 1:20) *ἐπίσκοπος*, i.e., an episcopal office, which being spoken expressly of one, agreeth no less unto them all, and therefore St Cyprian, speaking generally of them all, calls them bish-

ops." The form of government at first established by the Apostles was that the laity or people should be subject to a college of ecclesiastical persons appointed for that purpose in every city. These, in their writings, they term sometimes "presbyters," sometimes "bishops." Thus St Paul to the elders at Ephesus says "Take heed to the flock over which the Holy Ghost hath made you overseers," i. e., bishops. But as the Apostles could not themselves be present in all churches, and as in a short time strifes and contentions arose, they appointed, after the order began at Jerusalem, some one president or governor over the rest, who had his authority established a long time before that settled difference of name took place whereby such alone were called bishops, and therefore, in the Book of Revelation, we find that they are entitled "angels." St Irenæus, martyred about the beginning of the third century, says "We are unable to number up them who by the Apostles were made bishops." In Rome, he tells us, they appointed Linus, and in Smyrna, Polycarp. St Ignatius witnesses that they made Evodius Bishop of Antioch. St Jerome says "All bishops are the Apostles' successors", and St Cyprian terms bishops "*prespositi qui apostolis vicaria ordinatione succedunt*" (presidents who succeed to the Apostles by vicarious ordination). Hooker says, in his usual judicious manner "Such as deny Apostles to have any successors at all in the office of their apostleship, may hold that opinion without contradiction to this of ours, if they will explain themselves in declaring what truly and properly apostleship is. In some things every presbyter, in some things only bishops, in some things neither the one nor the other, are the Apostles' successors." And he adds, what fairly states the episcopal theory on this subject "The Apostles have now their true successors, if not in the largeness, surely in the kind of that episcopal function whereby they had power to sit as spiritual ordinary judges, both over laity and over clergy, where churches Christian were established." We find, also, that throughout those cities where the Apostles did plant Christianity, history has noted a succession of pastors in the seat of one, not of many, and the first one in every rank we find to have been, if not some Apostle, yet some Apostle's disciple. By Epiphanius the bishops of Jerusalem are reckoned down from St James to his own time, and Tertullian, writing in the second century, has the following "Let them show the beginnings of their churches, let them recite their bishops one by one, each in such sort succeeding other that the first bishop of them have had for his author and predecessor some Apostle, or at least some apostolical person who persevered with the Apostles, for so apostolical churches are wont to bring forth the evidence of their estates." The judgment of the Church of England, as to the primitive existence of bishops, is to be found in the preface to the ordination service, drawn up in the reign of Edward VI, where it is said "It is evident unto all men diligently reading the Holy Scripture and ancient authors, that from the Apostles' time there have been these orders of ministers in Christ's Church—bishops, priests, and deacons." St Thomas Aquinas, however, distinguishes technically by saying that "the episcopate is not an order, but a dignity within an order." Accordingly, in the Roman Catholic church, while ordination

has always been performed by bishops, some other functions usually considered episcopal are at times delegated to priests, thus confirmation is occasionally administered by priests—with oil, however, blessed by a bishop.

According to the other, or Presbyterian theory of bishops, no traces of a hierarchy are to be found in the earliest churches. The superintendents or directors appointed over the first churches by the Apostles or chosen by the members of the congregations were unquestionably styled indifferently presbyters or bishops—the former title being borrowed from the Jewish synagogue, the superintendent or director of which was called the elder (Gr *presbyteros*), the latter (*episcopos*) being familiar to the heathen converts as the title of a civil office corresponding in function to that of a Christian pastor. But this original equality did not last long. As new churches multiplied, those formed round the original church remained in confederacy, though each having its own bishop or presbyter, and in the meetings of the pastors to regulate the common affairs one must of necessity preside, most likely determined by age, superior piety, or other qualification. From this simple circumstance as is indicated by Clemens Alexandrinus in the beginning of the third century, sprang the habit of looking upon one of the bishops as superior to the others, and this superiority, at first personal and accidental, soon came naturally to be regarded as attached to the bishop of a particular congregation. In his case the word "bishop" came to signify an overseer of pastors rather than an overseer of people. The monarchical form of state government favored this tendency and converted the president of a presbytery into the privileged superintendent of his brother pastors. The assumption was resisted by the presbyters at first, but from the middle of the fifth century episcopacy, or the domination of bishops, continued to gain the upper hand over presbyterianism, or equality of all pastors.

In the third century bishops appear still dependent on the advice of their presbyters and the consent of the people and shared with the former the office of teaching and the cure of souls. As yet their exclusive privileges or functions were limited to confirmation, ordination of ministers, consecration of sacred things, settlement of secular differences among Christians, and management of the revenues of the Church. But the tendency to subordination and unity did not rest here. Among the bishops, at first all equal, those of the larger and more important cities began gradually to acquire a superiority over those of inferior cities. When Christianity was made the religion of the Roman Empire, the bishops became more and more monarchical and put themselves on the footing of ecclesiastical princes. The chief cities of the larger civil provinces rose to be seats of extensive dioceses, the bishops of these assuming the distinctive titles of *patriarch*, *metropolitan*, *papa*—titles of courtesy that had long been applied to all bishops, while the less important provinces, with their capitals and bishops, became subordinate. Among these provincial bishops, again, three, from obvious causes, acquired a prominence that cast all the rest into the background, viz, Alexandria, Constantinople, and Rome. The beginnings of the ascendancy of the Roman Pontiff, whatever may be thought of its claim

to divine institution are indisputably discernible as early as the end of the second century.

In the Roman Catholic church the episcopal office is the foundation of the whole system. Christ's Apostles are held to have transferred their functions to the episcopacy as a body. Every bishop, therefore, exercises within his own diocese, first, the *ius magistratum*, i.e. the right of maintaining and propagating the orthodox faith, and second, the *ius ordinis*, or regulation of the sacred and mysterious rites of the priestly office, some of which are transferred to the inferior clergy, as *iura communia*, while others remain the privileges of the bishop (*iura propria*). Among episcopal prerogatives, in addition to those already mentioned as assigned to them in the third and fourth centuries, are anointing of kings, consecration of abbots, etc. They have also the management of the Church property in their respective dioceses and the oversight of all ecclesiastical institutions. They are appointed by the Pope. In the United States the clergy of the diocese who are entitled to share this function send to Rome a list of three names in order of preference, designating them as *dignissimus*, *dignior*, and *dignus*, a similar list is submitted by the other bishops of the province. The Pope may be guided by these recommendations and nominate one of these men, or he may set the lists aside altogether and make his own selection. In some European and South American countries, as a result of past compromises or concordats, the head of the state is allowed to nominate, subject, of course, to papal confirmation. The consecration takes place normally at the hands of three bishops, this number having been required from post-apostolic times, though a single consecrator would suffice for validity. After the elaborate ceremonies of consecration, the new bishop takes his place upon his throne and gives his blessing to the people committed to his oversight. (For the special vestments worn by Roman Catholic bishops, and their uses, see COSTUME, ECCLESIASTICAL.) In case of the incapacity through age or infirmity of a diocesan prelate, an assistant or coadjutor bishop is appointed, who bears the title of some extinct see *in partibus infidelium*, it being contrary to ancient usage to consecrate a bishop with a roving commission. See TITULAR BISHOPS.

In the Greek church the office of bishop is essentially the same, though the powers of the incumbent are somewhat more restricted. Greek bishops are practically always chosen from the monastic orders and generally from the archimandrites or abbots of those orders.

The episcopal office in its essentials has practically disappeared from the Protestant communities of the continent of Europe, although the title has been retained in Sweden, Norway, and Denmark. The bishops of the two former countries, while they are from the ecclesiastical standpoint no more than the superintendents of other Lutheran churches, have retained some of their ancient prerogatives, such as seats in Parliament, and still use the mitre, pallium, and crozier. In Germany the title has occasionally appeared in modern times among Protestant churches, having been conferred, for example, by Frederick I and Frederick William III.

In no other Protestant country have the prerogatives and revenues and functions of bishops remained so little impaired as in England, where the Reformation was guided by the King's own hands and, being propagated from above

downward, was effected in a very conservative spirit. Episcopacy was abolished by law under the Commonwealth, but at the Restoration the bishops were also restored, being connected closely in the thought of the time with monarchy, on James I's principle of "no bishop, no king," and have since retained their position in church and state. They are elected by the chapter of each cathedral church by virtue of a license from the crown, this is the theory, but actually the bishops of the Church of England are appointed by the crown on the advice of the prime minister, since no chapter ventures to disregard the nomination which accompanies the *congé d'élire*. The sovereign on the vacancy being notified, sends to the dean and chapter a letter missive, or *congé d'élire*, containing the name of the person to be elected, and if they do not elect in the manner appointed by the act, or if the archbishop or bishop appointed for the purpose refuse to confirm, invest, and consecrate the bishop-elect, the recusants incur the penalty of a *præsumptio* (q.v.). A bishop cannot be *deposed*, as it is supposed that the order itself cannot absolutely be taken from him: he may, however, be *deprived*, as was done to the Bishop of Clogher in 1822, he may also resign his see, and he may be removed from one see to another, which is called *translation*, but this practice is now less frequent than it used to be. The Dean and Chapter of Canterbury claim it as an ancient right of that church that every bishop of the province is to be consecrated in it, or the archbishop to receive from them a license to consecrate elsewhere, and it is said that a long succession of licenses to that purpose are regularly entered in the registry of that church. Bishops, upon their election, become peers of the realm and have seats in Parliament along with the other nobles, but the right under which they sit there, whether in respect of their baronies or by usage and custom, is a matter of uncertainty. It appears, however, that the bishops sat in the Witenagemote, under the Saxon monarchs, as spiritual persons, for they were not barons until William the Conqueror turned their possessions into baronies and subjected them to the tenure of knights' service. The bishops created by Henry VIII—viz. Bristol, Gloucester, Chester, Oxford, and Peterborough, as also some lately created bishops—sit in Parliament, though they do not hold their lands by baronial tenure. The bishops withdraw from the House (under protest, however) when any capital charge is to be decided. In respect of their persons bishops are not peers with the nobility, and in case of alleged crimes they are tried by a jury in the same manner as commoners, as was the case with Crammer and Fisher. When a see is vacant, the archbishop of the province is guardian of the spiritualities, but he cannot as such consecrate or ordain or present to vacant benefices. The sovereign has custody of the lay revenues during a vacancy. Queen Elizabeth kept the see of Ely vacant 19 years.

Including the two metropolitans, there are 35 diocesan bishops in England, most of them bearing the titles of pre-Reformation sees. They are Canterbury, York, London, Durham, Winchester, Bangor, Rochester, Exeter, Peterborough, St David's, Worcester, Chichester, Lichfield, Ely, Oxford, St Asaph, Manchester, Hereford, Chester, Llandaff, Lincoln, Salisbury, Bath and Wells, Carlisle, Gloucester, Bristol, Ripon,

Norwich, Sodor and Man, Truro, St Albans, Liverpool, Newcastle, Southwell, and Wakefield. There is also a constantly increasing number of suffragan or assistant bishops who bear territorial titles, but have no independent jurisdiction and no seats in Parliament. The Episcopal Church of Scotland has 7 bishops, and that of Ireland 2 archbishops and 11 bishops. The first colonial bishopric of the Anglican communion was that of Nova Scotia, founded in 1787, but the nineteenth century saw a prodigious increase in their numbers. There are now 21 bishoprics in British North America, 7 in the West Indies, 11 in India and Ceylon, 23 in Australia, 7 in New Zealand, 13 in South Africa, and 31 under the direct jurisdiction of the Archbishop of Canterbury, mostly in non-Christian lands.

In the Protestant Episcopal Church of the United States, the functions of the bishops, in religious matters, are similar to those of English prelates. In political affairs they have, of course, no official power. They are chosen to office by the convention of clerical and lay deputies of the diocese over which they are to preside, except in case of missionary bishops, who are nominated by the House of Bishops and elected by the House of Clerical and Lay Deputies. There are at present about 110 in the House of Bishops.

In England, under the Archbishop of Westminster as primate, there are 15 Roman Catholic bishops. The hierarchy here was restored in 1850, and in 1878 in Scotland, where there are 2 archbishops and 4 bishops. The assumption of territorial titles by Roman Catholic bishops in England and Scotland was made illegal by the Ecclesiastical Titles Act of 1851, but the law, passed in a moment of great popular excitement, has always been a dead letter. In Ireland there are 4 Catholic archbishops and 23 bishops. In the United States the Church has 14 archbishops, with the Archbishop of Baltimore as primate, and about 100 other diocesan bishops, besides an apostolic delegate.

In the Methodist Episcopal church the bishops are elected by the General Conference. Their duties are those included in a general superintendence of the whole church. Authority is vested in them all, and its administration distributed among them by mutual agreement. They preside over meetings of the annual conferences, ordain ministers, and appoint them to their fields of labor. There are 36 in the Northern branch and 14 in the Southern church. They have no dioceses and are all itinerant. The Reformed Episcopal church has 6 bishops, and the African Methodist Episcopal church 17. Other Protestant bodies in the United States have adopted the episcopal form of government, among them the United Brethren in Christ and the Evangelical Association. See ARCHBISHOP, APOSTOLIC SUCCESSION.

For the discussion of the theory, consult Lightfoot, *St Paul's Epistle to the Philippians* (London, 1888); Baur, *Das Christenthum und die christliche Kirche der ersten drei Jahrhunderte* (Tübingen, 1853); Hatch, *Organization of the Early Christian Churches* (London, 1881); Wordsworth, *Theophilus Anglicanus* (London, 1843); Dollinger, *The First Age of the Church* (Eng. trans. Oxenham, London, 1866); Moberly, *Ministerial Priesthood* (London, 1898); Réville, *Les origines de l'épiscopat* (Paris, 1894); Jungfer, *Die Unterschiede zwischen der Papstwahl*

und den Bischofswahlen nach dem gemeinen Kirchenrecht (Borna Leipzig, 1909).

BISHOP. A beverage best known in England, composed of red wine (claret, Burgundy, etc.) poured warm or cold upon ripe bitter oranges, sugared and spiced to taste, and drunk either hot or cold. The oranges should be carefully selected, and the white part between the peel and pulp thrown away. If white wine be used, the beverage is called *cardinal*, and with Tokay it becomes *pope*. "Bishop" was known under other names in Germany during the Middle Ages, having been imported into that country from France and Italy, its present name seems to have been bestowed during the seventeenth century.

BISHOP, ANNA RIVIÈRE (1814-84). An English operatic singer, born in London. She was the wife of the composer Sir Henry Rowley Bishop. Her first appearance was in 1837, and she soon became widely known in Europe and America. In 1839 she sang in the principal cities of the Continent. She returned to England in 1846 and in the following year came to America and became an exceedingly popular singer in the United States, Canada, and Mexico. She married Martin Schultz, a New York merchant, in 1858. In 1866 she sang in Manila and China. She lost her voice in 1868 and retired from the stage.

BISHOP, SIR HENRY ROWLEY (1786-1855). An eminent English composer of music. He was born in London. His principal musical instructor was Signor Francesco Bianchi, an opera composer settled in London. In 1806 Bishop was appointed composer of ballet music at the opera. The opera *Circassian Bride* (1809) won a triumph at Covent Garden, and a long list of works for the stage followed. From 1810 to 1824 he was director of the music at Covent Garden Theatre. He was not only one of the original founders of the London Philharmonic Society, but also one of its first directors. From 1840 to 1848 he conducted the *Concerts of Ancient Music*. He arranged several volumes of the *National Melodies* and succeeded Sir John Stevenson as arranger of the airs selected by Moore for his *Melodies*. Bishop composed the familiar music to John Howard Payne's *Home, Sweet Home*. In 1839 he received the degree of bachelor of music from the University of Oxford and in 1841 was elected Reid professor of music in the University of Edinburgh. In 1842 he was knighted. He resigned his Edinburgh chair in 1843 and in 1848 was elected professor of music in the University of Oxford.

BISHOP, ISABELLA BIRD (1832-1904). An English traveler and author. She was born in Yorkshire, England, Oct. 15, 1832, the daughter of Rev. Edward Bird. She began traveling in North America at an early age and later spent 13 years in Asia, showing skill, courage, and tact. Married to John Bishop, M.D., in 1881, and widowed in 1886, she continued her travels, lectures, and writing. In 1892 she was elected a fellow of the Royal Geographical Society as the first woman who joined the society. Her nine volumes of travel (many of which first appeared under her maiden name, Bird) on North America, Hawaii, Japan, the Malay Peninsula, Persia, Kurdistan, Tibet, Korea, Siberia, China, and Morocco, show great ability. In 1901 she went on a philanthropic mission to India. Among the best known of her books are *Korea and her Neighbors* (1898) and *The Yang-*

tse Talley and Beyond (1900) Consult Stoddart, *The Life of Isabella Bird* (New York, 1908)

BISHOP, JOSEPH BUCKLIN (1847-) An American journalist, author, and public official, born at Seekonk, Mass. He graduated from Brown University in 1870 and at once took up newspaper editorial work, writing first on the New York Tribune, later on the New York Evening Post, and then in 1900-05, as chief of the editorial staff on the New York Globe. In 1905 he was appointed secretary of the Isthmian Canal Commission, having general charge of all construction publicity plans and editing a weekly paper, the *Canal Record*. He remained in this office until the canal was completed. He wrote many articles for journals and magazines, and in 1913 published *The Panama Gateway*, and, with Robert E. Peary, *Uncle Sam's Panama Canal and World History*. He is also author of *Cheap Money Experiments* (1892), *Our Political Drama* (1904), and *Issues of a New Epoch* (1904)

BISHOP, SETH SCOTT (1852-) An American physician, born at Fond du Lac, Wis. He graduated in 1876 at Northwestern University and subsequently was appointed professor of otology at the Chicago Post-Graduate Medical School and Hospital and professor of diseases of the nose, throat, and ear at the Illinois Medical College. He published *Diseases of the Ear, Nose, and Throat, and their Accessory Cavities* (4th ed, 1908), and *The Ear and its Diseases* (1906)

BISHOP, WILLIAM HENRY (1847-) An American novelist, born at Hartford, Conn., and a graduate of Yale University in 1867. The best known of his novels and sketches are *Detmold* (1879), *The House of a Merchant Prince* (1882), *Choy Susan and Other Stories* (1884), *The Golden Justice* (1887), *The Brownstone Boy and Other Queer People* (1888, reprinted in 1902, with the title *Queer People*), *A House Hunter in Europe* (1893), *Writing to Rosina* (1894), *The Yellow Snake* (1902), reprinted as *A Pound of Treasure* (1904) *Old Mexico and her Lost Provinces* (1883) is a book of travel. Mr. Bishop was appointed United States Consul at Genoa in 1903, and was Consul at Palermo from 1905 to 1910

BISHOP AUCKLAND A town in the county of Durham, England, 10½ miles southwest of the city of Durham, on an eminence near the confluence of the Wear and Gauness (Map England, E 2) There is a fine town hall, built in 1863. The chief building of interest, however, is Auckland Castle, the palace of the bishops of Durham, a large pile covering about 5 acres in the midst of a park of 800 acres. The site was selected during the reign of Edward I (1272-1307). The principal industries of the town are iron manufactures, and in the neighborhood are several collieries. Pop, 1891, 10,500, 1901, 12,000, 1911, 13,834

BISHOP BLOU/GRAM'S APOLOGY. A fine dramatic monologue by Robert Browning

BISHOPS' BOOK A primer of doctrine and instruction, compiled by a commission of bishops and ministers of the English Church in 1537 and known also as *The Institution of a Christian Man*. It contains an exposition of the Apostles' Creed, the Seven Sacraments, the Ten Commandments, the Lord's Prayer, and the doctrines of justification and purgatory. It is contained in *Formularies of Faith Put Forth by Authority*

during the Reign of Henry VIII (Oxford, 1823) Consult Hardwick, *Reformation* (London, 1856)

BISH/OPSGATE/ A London street, so called from a gate, which once stood in the north wall of the city

BIS/KRA, or BIS/KARA (named after the tribe *Bishri*) A town and commune in the department of Constantine, Algeria, on the south side of the Aures Mountains, 117 miles southwest of Constantine by rail (Map Africa, E 1) It is the most important military post of the district and formerly had a large caravan trade between the Sahara and the Tell. Biskra is situated in a fertile oasis, rich in date palms and olives. Its pleasant climate and sulphur springs in the vicinity have made it a popular French winter resort. In summer it is very warm and a temperature of 120° F is not unusual, while winds in winter often cause intense cold. The town has broad streets, with substantial houses. Fort Saint-Germain contains the barracks, government offices, and hospital. Burnous and carpets are manufactured, and iron, limestone, and saltpetre are mined in the neighborhood. The Zaba of the Romans, it was an important town under the Moors, but declined after the plague of 1863, by which 71,000 inhabitants perished. It was taken by the French in 1844. Pop (commune), 1891, 7166, 1901, 7528, 1911, 10,606

BISLAND, ELIZABETH See WETMORE, ELIZABETH BISLAND

BISMARCK, biz/mark The capital of North Dakota, and the county seat of Burleigh County, on the Missouri River, and on the Northern Pacific and the Minneapolis, St. Paul, and Sault Sainte-Marie railroads (Map North Dakota, E 3) It is attractively situated on the east bank of the river, which is here crossed by a magnificent bridge of steel and iron, 50 feet above high water, and contains a fine courthouse, several Federal institutions, the State penitentiary, the State library, United States Indian School, Bismarck Hospital, and St. Alexis' Hospital. The capitol, completed in 1894 at a cost of \$500,000, is the most prominent building. The city controls a very extensive river trade, the principal commodities being coal, which abounds in that region, grain, hides, etc. The industrial establishments include grain elevators, a large twine plant, a large flouring mill, a creamery, and a foundry. Four miles distant is Fort Lincoln, a United States military post, from which General Custer started on the expedition which resulted in the annihilation of his entire troop. Lewis and Clark spent the winter of 1804-05 on or near the site of Bismarck, which was permanently settled in 1873 and incorporated shortly afterward. In 1883 it was made the capital of Dakota Territory and in 1889 became the capital of North Dakota. Bismarck adopted the commission form of government in 1913. It has a street-car line, owned and operated by the State. The North Dakota Industrial Exposition is held in Bismarck in October of each year. Pop, 1905, 4913, 1910, 5493

BISMARCK, biz/mark, Ger pron bis/mark, FRIEDRICH WILHELM, COUNT (1783-1860) A German soldier and military author. He was born at Windhelm, Westphalia, and was a member of the Rhenish branch of the Schönbach family of the Bismarck family. He served with Hanoverian, and afterward with Nassau regiments, and in 1804 became a member of

the English German Corps. Compelled to resign from the English service because of a duel, he entered the cavalry service of Wurttemberg, at that time in alliance with France. He greatly distinguished himself in the campaigns against Austria (1809) and Russia (1812). After the battle of Leipzig he was employed in various diplomatic missions in the service of Wurttemberg. He was a prolific writer, especially on cavalry tactics, and a great admirer of Napoleon, whose later campaigns he describes in the work entitled *Aufzeichnungen* (1846). Among his other publications are the following *Vorlesungen über die Taktik der Reiterei* (1818, 3d ed., 1826), *Reiterbibliothek* (6 vols., 1825-31); *Identität der Reiterei* (1829).

BISMARCK ARCHIPELAGO, ar'ki-pel'a-gō. A group of islands in the Pacific Ocean, situated about 56 miles east of New Guinea, and extending from lat 2° to 6° 30' S, and long 148° to 155° E (Map Australasia, G 3). Its area is estimated at 20,000 square miles, and it comprises the islands of New Pomerania (New Britain), New Mecklenburg (New Ireland), New Laurenburg (Duke of York Islands), New Hanover, Admiralty, Anchorite, Commerson, Hermit, and a few others. The chief products are copra, cotton, coffee, and rubber. The annual imports and exports are valued at about a quarter of a million dollars each. The population is estimated at 188,000 and consists chiefly of Papuans. In November, 1885, they were declared a German protectorate and placed under the control of the German New Guinea Company. Formerly called New Britain Archipelago, the group was renamed in honor of the great statesman. Consult Verbeek, "Die Entdeckung des Bismarck-archipels," in *Beiträge zur Kolonialpolitik und Kolonialwirtschaft* (Berlin, 1899-1900); Thilenius, "Geologische Notizen aus dem Bismarck-Archipel," in *Globus*, vol. lxxvii (Brunswick, 1900); Stephan and Graebner, *New Mecklenburg* (Berlin, 1907); Stephan, *Südsee- und Ostsee-Beiträge zur Kunst des Bismarck-Archipels* (Berlin, 1907).

BISMARCK - BOHLEN, bis'mark - bō'len, FRIEDRICH ALEXANDER, COUNT (1818-94). A Prussian soldier. He was born on the family estate at Karlsburg. From 1846 to 1848 he was the official military attaché and companion of Prince Frederick Charles at the University of Bonn. In 1864 he was raised to the rank of major general, in which capacity he served in the Austro-Prussian War. Upon the conclusion of that campaign he was appointed Governor of Hanover (1866). He was commandant of Berlin in 1868, and Governor-General of Alsace-Lorraine during the Franco-Prussian War, upon the conclusion of which he was appointed adjutant-general to Emperor William.

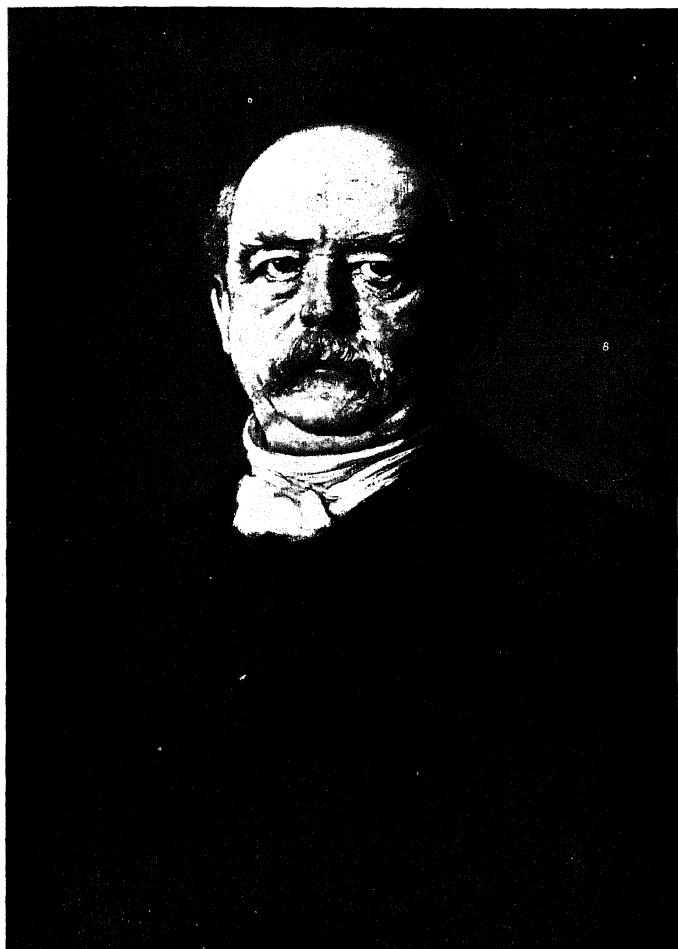
BISMARCK BROWN. See COAL-TAR COLORES.

BISMARCK-SCHONHAUSEN, bis'mark shōn'hou-zen, HERBERT NIKOLAUS VON, PRINCE (1849-1904). A German statesman, eldest son of Prince Otto von Bismarck. He was born in Berlin and studied at the universities of Bonn and Berlin. He fought in the Franco-Prussian War, and was appointed an officer Sept. 2, 1870. In 1873 he entered the Foreign Office and served at Bern and Vienna, acting subsequently as private secretary to his father from 1877 to 1881. In 1882 he was appointed Counselor of Legation at London and in 1884 he was sent in a similar capacity to St. Petersburg, whence he was in the same year transferred as Ambassador to The

Hague. He became Undersecretary of State in 1885, and Secretary of State in 1886. After the resignation of his father (March 20, 1890) retired from the diplomatic service and withdrew to his estate at Schonhausen. He was elected to the Reichstag in 1893 and 1898 as member of the Conservative party. The Treaty of 1885 between Germany and England, relating to the colonial boundary question, was negotiated by him. He also presided at the Samo Conference held in Berlin in 1889. His political speeches have been published by Penzler under the title *Politische Reden* (1890).

BISMARCK-SCHONHAUSEN, KARL OTTO EDUARD LEOPOLD VON, PRINCE (1815-98). First Chancellor of the German Empire. He was born April 1, 1815, at the family manor of Schonhausen, in the district of Magdeburg, Prussia. He was one of the six children of Karl Wilhelm Ferdinand von Bismarck, a captain in the Royal Bodyguard of Prussia. His mother was the daughter of Herr Menken, a high official in the Prussian civil service. The family traced its lineage back directly for five centuries, and many of its members had held high positions in the military service of Brandenburg and Prussia and at court. In 1832-33 Bismarck studied jurisprudence and political science at Göttinge where he made the acquaintance of John Lothrop Motley, the American historian, an acquaintanceship which ripened into the strong friendship of later years. He studied for three semesters in Berlin, was admitted to the bar in 1833 and was referendary in Aax-la-Chapelle at Potsdam in 1836-37. In the latter city and Griefswald he served his term in the army, lieutenant in the Life Guards. In Griefswald too, he familiarized himself with the science of agriculture. On July 28, 1847, he married Johanna von Putkammer, and in the same year entered the first General Diet of Prussia, where he became known as an able and aggressive champion of ultraconservative measures. In 1848 he was elected to the Second Chamber of the Prussian Diet, called into existence by the revolutionary outbreak of 1848, and as a member of that body and of the Erfurt Parliament (1850) he advocated an increase in the powers of the monarchy and the consolidation of the German people through the joint action of Prussia and Austria. At the same time he combated the Erfurt and Frankfurt plans of union. In the early part of his career Bismarck gave little indication, except in his strenuous advocacy of Prussia's leadership, of the aims towards which his later activity was to be directed.

After holding the position of Prussian Secretary of Legation at Frankfurt-on-the-Main, Bismarck was appointed, in 1851, Prussian Ambassador to the Germanic Diet at Frankfurt. He had now apparently become convinced of the need of constitutional concessions in order to unite the German people and of the inherent antagonism between the interests of Austria and the cause of German unity, for he adopted more liberal programmes and assumed that attitude of hostility to Austrian pretensions which he maintained so consistently and successfully. He was so outspoken in his opposition to Austria that it was deemed prudent, in 1859, on the eve of the Franco-Italian War against Austria, to transfer him to St. Petersburg. There he labored effectively to strengthen the friendly relations between Russia and Prussia and gained the highest esteem of Alexander II. When, c



OTTO VON BISMARCK
FROM A PAINTING BY FRANZ VON LENBACH

the death of Frederick William IV, Jan. 2, 1861, William I succeeded to the Prussian throne, Bismarck was transferred from St. Petersburg to Paris, and in September, 1862, was made head of the Prussian cabinet and Minister of Foreign Affairs. The King was then faced by a Diet which was in stubborn opposition to an army bill, but he found in Bismarck a minister daring enough to govern without a budget and without parliamentary majority. In this manner began the lifelong alliance between King William and his great minister. Bismarck now entered upon his life work, the unification of Germany under Prussian leadership, and the placing of the new Germany in the forefront of European nations. In pursuance of this object he developed a thoroughly consistent and often ruthless policy and carried it out without hesitation. Speaking to the Budget Commission of the Prussian Diet, Sept. 30, 1862, he said:

"Our blood is too hot, we are fond of bearing an armor too large for our small body. Germany does not look to Prussia for liberalism, but for power. Let Bavaria, Württemberg, Baden, indulge in liberal ideas; no one will assign them the rôle destined for Prussia. Prussia must consolidate its might and nurse it for the favorable moment. Prussia's boundaries as determined by the Congress of Vienna are not conducive to its welfare as a sovereign state. Not by speeches and resolutions of majorities are the mighty problems of the age to be solved—that was the mistake of 1848 and 1849—but by blood and iron."

This much-misunderstood statement, so characteristic of Bismarck, concisely summarizes the subsequent development of German history. Its full significance is elucidated by Bismarck in his *Autobiography*. Bismarck disliked war, but he saw no way of bringing the jealous German states together except through war. He regarded it as indispensable to drive Austria, as an essentially non-German and antinational state, out of the Confederation, and he utilized the Schleswig-Holstein affair (see SCHLESWIG-HOLSTEIN) to antagonize Austria and finally to force an issue between that power and Prussia. At the same time he made Prussia the champion of the demand for a national German Parliament based on popular suffrage. This seemed so at variance with his earlier political course that Germany found it difficult to believe in his sincerity. Nevertheless, it was entirely consistent with the development of his character and opinions. He gained Austria over to his views in the Schleswig-Holstein matter and with her cooperation entered upon the war against Denmark (1864). He won the confidence of Italy, formed an alliance between that state and Prussia, and when the Schleswig-Holstein controversy came to a crisis in the Germanic Diet, Prussia was ready for action. On June 1, 1866, Austria referred the settlement of the question to the Diet, and on June 10 Bismarck addressed to the German courts a letter setting forth Prussia's national policy. The following day Austria moved in the Diet for federal execution against Prussia, and the tie vote was decided in the affirmative, whereupon the representative of Prussia presented his government's plan for a new national organization, declared the Confederation dissolved by its own action, and withdrew. Prussia at once invaded the German states that adhered to Austria, while the main Prussian army was pushed into Austrian terri-

tory. The brief and brilliant campaign (see GERMANY and SEVEN WEEKS' WAR) secured the first object in Bismarck's programme. The Peace of Prague excluded Austria from the German Confederation, which was reorganized under a permanent Prussian presidency as the North German Confederation. It was still necessary to bring the South German states into the Union, to prick the bubble of Napoleon III's self-assumed leadership in European affairs, and to establish a more satisfactory western boundary for Germany by making the Rhine a truly German river. Bismarck forced an issue with France with the same relentlessness and the same certainty of result that had characterized the contest with Austria. The mistakes of the French diplomacy (see BENEDETTI) were utilized to the full, and France was goaded into a war to which she was wholly unequal. (See FRANCO-GERMAN WAR.) Throughout the war Bismarck was at the side of his sovereign, evincing in the course of the peace negotiations extraordinary determination and executive capacity. When on the 18th of January, 1871, King William of Prussia at Versailles accepted the title of Emperor of the new German Empire, Bismarck's policy had been vindicated. Before this his triumph had been won by constant contention against the centrifugal tendencies of the old Germany and in spite of the steadfast hostility of a large section of the German people. Now he became a popular idol. On April 16 the text of the Imperial Constitution was promulgated and Bismarck, now created a prince, became the first Chancellor of the new Empire. His next task was that of organizing the internal affairs of Germany upon the new basis, and of developing an Imperial policy worthy of a power of the first rank.

There is no ministerial responsibility under the Imperial Constitution of Germany, nor is the parliamentary opposition organized as it is in the United States and England. Bismarck never came to believe in the wisdom of popular majorities or control by a partisan parliament. He saw the necessity of a popular basis for a strong government, but he believed above all in a strong executive. And the necessity of German unity was always uppermost in his mind. The promulgation of the doctrine of papal infallibility by the Vatican Council of 1870 was odious to him as tending to weaken the loyalty of the German Catholics. In no sense intolerant of religions as such, he was opposed to any political religious organizations within the state which recognized any other leadership except that of the Prussian monarchy. In January, 1873, he caused the introduction into the Prussian Diet of certain laws to regulate the relations of church and state. This was brought on the six years' struggle with the Clericals, known as the *Kulturkampf* (q.v.), in which Bismarck made the great mistake of his career, carrying his measures so far that in the inevitable reaction he was forced to acknowledge a virtual defeat. Bismarck's position seems to have been simply that of defending the authority of the state against outside interference. In 1874, replying to a Catholic attack in the Prussian Diet, Bismarck stated his principles clearly, acknowledging his duty to respect the dogmas of the Catholic church merely as dogmas, and adding: "If the doctrine of infallibility be so interpreted as to lead to the establishment of an ecclesiastical *imperium in imperio*; if it lead

to the nullification of the laws of this country because unapproved by the Vatican, I am naturally driven to assert the legitimate supremacy of the state. We Protestants are under the conviction that the Kingdom of Prussia ought not to be ruled by the Pope, and we demand that you, the Ultramontane section of the Roman Catholics, respect our convictions as we do yours." The controversy led to an attempt upon Bismarck's life by a mechanic named Kullmann in 1874. Finally, however, Ultramontane resistance drove Bismarck into an attitude of intolerance which proved untenable. Personally he had passed through four stages in his religious views, having arrived through rationalism, skepticism, and conventional Christianity at a profound religious conviction with a firm faith in God and immortality. He was tolerant because he cared little for creeds and outward forms.

An equally difficult problem confronted Bismarck in the growing power of the Socialists. Two attempts on the life of the Emperor in 1878, by avowed Socialists, enabled the Chancellor to overcome the scruples of the Liberals in the Reichstag, and to secure the passage of special laws for the suppression of socialistic agitation. The *Kulturkampf* had brought Bismarck into alliance with the National Liberals, his conservative tendencies broke this alliance, and he came to an understanding with the Conservatives and Catholics. Now that he had suppressed the political activity of the Socialists for the time being, Bismarck very characteristically gave his attention to checking the movement by making many features of the Socialist programme his own, and he imitated a policy of paternalism, which has become the foundation of state socialism in Germany to-day. The Prussian common law, as promulgated in the eighteenth century, had long ago insisted in general terms that it was the bounden duty of the state to provide employment for the workman, and Bismarck believed thoroughly in this principle. "Give the workman work as long as he is healthy," he said, "assure him care when he is sick, insure him maintenance when he is old."

Is it not established in our social relationships that the man who comes before his fellow citizens and says, 'I am healthy, I desire to work, but can find no work,' is entitled to say also, 'Give me work,' and that the state is bound to give him work?" Germany, and particularly Prussia, now embarked extensively upon a policy of governmental ownership of industrial enterprises, while for the protection of the workman against accident, sickness, and old age an extensive series of compulsory insurance acts were adopted (1883-89).

With the industrial and commercial development of the Empire, the time seemed ripe for expansion beyond the seas, and in 1884 Bismarck entered upon his colonial policy, at first half-heartedly. In a speech before the Reichstag, June 26, 1884, he declared his opposition to forced colonization, and his willingness to support only such a colonial policy as grew out of the need of protecting German subjects in foreign lands. He favored leaving the management of affairs largely to chartered trading companies, and added "It is not our intention to found provinces, but to foster commercial enterprise." To stimulate industry and thereby to check the continuous emigration from Germany, Bismarck advocated a protective tariff.

To settle the African question, as raised by the work of the International African Association, he arranged a conference at Berlin in 1884-85, which secured the recognition of the Congo Free State and laid down the lines upon which the partition of Africa has been effected. Bismarck was the author of the policy of subsidizing steamship lines from Germany to Asia, Africa, and Australasia, and the constant advocate of the Baltic and North Sea Canal, which was not constructed until after his retirement.

The genius of Bismarck was always most conspicuous in international affairs. He deliberately brought on three wars—with Denmark, Austria, and France—in order to further the great consummation of German unity. The German Empire once established, the great Chancellor's policy became one of peace. He avoided entangling Germany in the Eastern Question, but when the rivals of Russia were aroused by the Treaty of San Stefano, in 1878, he asserted Germany's leadership in Europe by inviting an international congress to meet at Berlin (See BERLIN, CONGRESS OF). He formed the Triple Alliance to secure Germany against both France and Russia, but at the same time maintained the most friendly relations with Russia. France he did not regard as a serious competitor of Germany after 1871. His matured convictions in regard to Germany's position are set forth in his autobiography. In that work, after some observations on Russia's relations to the Eastern Question, he observed that if Russia failed to receive assurance of German neutrality, the old coalition of the Seven Years' War—the alliance, that is, of Austria, Russia, and France against Prussia—might be revived. "If Germany possesses the advantage," he said, "of having no direct interest at stake in the East, she labors, on the other hand, under the disadvantage of an exposed position in the heart of Europe, with an extended frontier, which has to be defended on every side, and surrounded by enemies ready to enter into alliance against her. At the same time Germany is, perhaps, the only great Power in Europe which is not tempted by objects unattainable except through war. It is our interest to maintain peace, while our continental neighbors, without exception, foster ambitions, either secret or officially avowed, which can be realized only by war. We must direct our policy in accordance with these facts—that is, we must do our best to prevent war, or at least, to restrict it." Bismarck's largeness of view and freedom from petty enmity is shown by his efforts, as soon as Austria had been beaten at Sadowa, to establish friendly relations between that Power and Germany. A man of strong passions, he allowed no prejudice to blind him to the requirements of sound national policy.

His attachment to Emperor William I was in every way creditable to him. After the death of the Emperor in 1888, Bismarck remained in office during the brief reign of his successor, the Emperor Frederick.

William II had learned his statecraft in the school of Bismarck, but it was inevitable that the autocratic young Emperor should come into collision with the strong-willed minister who had been so long accustomed to the personal direction of Prussian and German affairs. Numerous quarrels finally led to the resignation of Bismarck, which occurred on March 20, 1890. He retired to Friedrichsruh. On leaving office

the title of Duke of Lauenburg was bestowed upon him by the Emperor, together with one of the highest military ranks (Generaloberst of cavalry). The open estrangement between the two continued until after Bismarck's severe illness in 1893, when the Emperor made advances towards a reconciliation, which took place in form at least. Bismarck's eightieth birthday (April 1, 1895) was made the occasion of a great demonstration throughout Germany. He was visited by the Emperor and by thousands of military and political associates, and a Bismarck Museum was founded in Berlin.

So positive a force in the life of his day necessarily aroused both intense admiration and bitter hostility. He was, beyond question, the greatest European statesman of the century and one of the greatest statesmen of all time. His genius was of the rare constructive type, and he is justly included in the trio of creators of modern Germany, together with the Great Elector Frederick William and Frederick the Great. He had set himself a great end, the realization of a united Germany and the fullest development of the German nation; he pursued it relentlessly and he achieved it by methods at least as unimpeachable as those applied to any similar task in history. Against his critics he could set up the worldly but weighty defense of success. He found Germany a group of jealous kingdoms and principalities, the shuttlecock of Austria and France. He left it a united nation, one of the world's great Powers, and the dominant force on the continent of Europe. In his *Gedanken und Erinnerungen*, the work of his years of retirement, commonly though somewhat inaccurately called, in its English translation, "Bismarck's Autobiography," he has left a valuable epitome of his views on many points of European policy. In this and in his collected speeches, letters, and papers must be sought his *Apologia*. In private life Bismarck was a kind husband and father, a genial friend, and a considerate landlord. Physically and mentally he was a man of surpassing power and endurance, and his capacity for work, creative or absorptive, was tremendous. Though not a scholar in the strict sense of the word, he was a man of wide information, always accessible to his ready memory. While not a finished orator, the pungency of his speech and the aptness of his quotations from history and literature always held his audience in the Reichstag. He died July 30, 1898. For his own epitaph he wrote simply, "a faithful German servant of the Emperor William I." He had three children—Countess Marie, born Aug. 28, 1848; Prince Herbert, born in 1849, died in 1904; and Count Wilhelm, born in 1852, and died in 1901.

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BISMARCK-SCHÖNHAUSEN, WILHELM ALBRECHT OTTO, COUNT VON (1852-1901). A German statesman, second son of Prince Otto von Bismarck, born at Frankfort-on-the-Main. He was educated at the University of Bonn and served in the Franco-Prussian War as an officer of ordnance. He was attached to the Imperial Chancellery from 1878 to the fall of 1879, when he was transferred to Alsace-Lorraine as assistant to the Governor. He again served in the Imperial Chancellery from 1881 to 1884, and was later successively appointed President of the province of Hanover (1889) and Governor of East Prussia (1895).

BISMUTH, biz'müth (Fr. *bismuth*, Ger. *Bismuth*, *Wismuth*, of unknown origin). A metallic element, possibly known to the ancients, but first clearly distinguished from tin by Basil Valentine in 1413. In the native state it is found widely distributed in small quantities, generally with ores of copper, lead, etc. It is further found in combination with oxygen as *bismite*, with sulphur as *bismuthinite*, with carbonic acid as *bismutite*, and as an alloy with tellurium, called *tetradymite*. These various minerals are widely distributed; but the principal commercial source is the metallic bismuth which is found in association with other ores, in the mines of Saxony and Bohemia, and at Monroe, Conn., in the United States. The commercial metal is obtained chiefly from the reduction works in Saxony, although a small quantity is smelted in England. The process by which the metal is obtained consists in first carefully hand-picking the ore, after which the selected pieces are roasted and the metal run off from the gangue into pots. By remelting at as low a temperature as possible, with one-tenth of its weight of nitre, a solid slag is formed by the nitre on the surface, with practically pure metal beneath. Bismuth (symbol, Bi; atomic weight, 208.0) is a brittle, grayish-white, crystalline metal of a distinctly red tinge. It melts at 268.3° C.; its boiling point is known to lie somewhere between 1450° and 1600° C. It is one of those substances that contract in melting, the specific gravity of molten bismuth being about 10.06, while that of the solidified metal is only about 9.82. Bismuth is a poor conductor of heat and electricity. The metal itself is used chiefly as a constituent of alloys and amalgams. With tin and cadmium it forms a fusible alloy known as Wood's metal, which melts at 60° C. (140° F.). This and similar bismuth alloys (see FUSIBLE METAL), besides having a remarkably low melting point, expand, like bismuth itself, in the act of solidification, thus giving a perfect cast. Small quantities have been used in the manufacture of bell metal. Bismuth combines with radicals to form diad, triad, and pentad salts, of which the trivalent compounds are the most stable. Its principal compound with oxygen is the trioxide, which is found native as the mineral bismite, and may be prepared artificially by igniting the bismuth

subnitrate until red fumes cease to come off. It is a pale-yellow, amorphous compound, used for glass and porcelain staining, as an addition to certain fluxes to prevent the production of color, and in gilding porcelain. The most important compound of bismuth is the nitrate, which may be made by dissolving metallic bismuth, or its oxide, or carbonate, in nitric acid, yielding a pearly white powder consisting of minute scales, which is used as a flux for certain enamels, owing to the fact that it increases their fusibility, as a colorless iridescent glaze on porcelain, and as a cosmetic for softening the skin, under the names of *blanc de fard* and *blanc d'Espagne*. It is an official medicine and was formerly termed *majesty of bismuth*, being largely used in chronic diarrhoea and cholera. Bismuth oxychloride, prepared by treating a solution of the normal nitrate with a dilute solution of common salt, yields a precipitate which is a white pearly powder that is used as a cosmetic under the name of *pearl-white* and also as a pigment. Bismuth citrate, bismuth carbonate, and bismuth and ammonium citrate are official medicines and are used chiefly as astringents. During the year 1911 172,093 pounds of bismuth, valued at \$311,771, were imported for consumption into the United States.

BISMUTHINITE A bismuth trisulphide that crystallizes in the orthorhombic system. It is of a lead-gray color and usually occurs massive with a foliated or fibrous structure, although sometimes it is found crystalline. The principal localities where this mineral occurs are various places in Cumberland, England, at Meymac, France, in Sweden, in Bolivia, South America, also in Beaver Co., Utah, and in Fresno and Mono counties, Cal. It has some value as an ore of bismuth.

BISON (Lat., Gk *βίον*, *bíon*, wild ox, cf. OHG *Wisunt*, *Wisant*, Ger *Wisent*, bison, AS *Wesend*, wild ox) A kind of wild cattle, characterized by massive and shaggy fore quarters. The name was applied by Pliny and subsequent Latin writers to a wild ox of Europe otherwise called *bonasus*, and probably the aurochs. More recently the term has been properly extended to the American "buffaloes," and erroneously to the East Indian gaurs. Zoologically the word is the name of a bovine genus, including the aurochs (*Bison bonasus*), the American bison (*Bison americanus*), and several extinct species of both continents.

Bisons differ from other oxen in the excessive development of their fore quarters, where the line of the back arches over the withers in a hump formed by the long dorsal spines that give attachment to the very thick and strong muscles needed to support the massive head, also in their more slender limb bones and ribs (which number 14 instead of 13), in the breadth and convexity of the front of the skull, where the horns spring from below the top line of the forehead, and in their six, instead of four, nasal bones. "Externally they differ in having the head heavily clothed with long, bushy hair, they also possess a heavy barb, and the fore legs are heavily fringed with coarse, long hair. The clothing hair of the body also differs from that of representatives of the restricted genus *Bos* and most of its allies in consisting mainly of short, curled, crisp wool in place of straight hairs. Their nearest ally is probably the yak" (Allen). The females are smaller, less

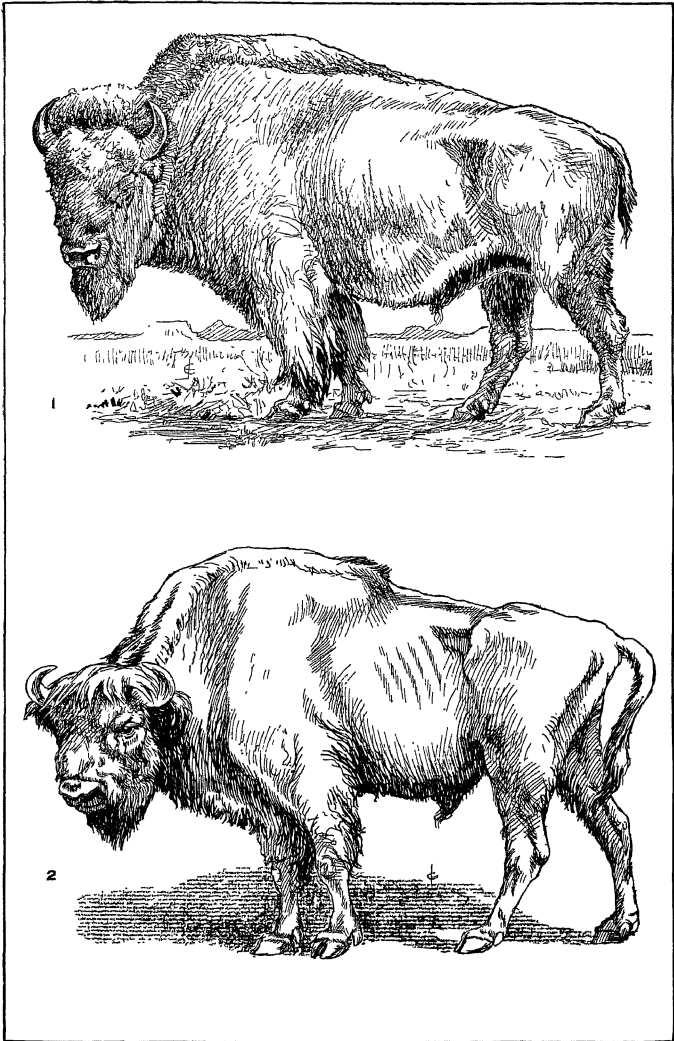
massive and shaggy in the fore quarters than the bulls, and with lighter horns. The two existing species will be treated of below. Three fossil species are recognized by J. A. Allen in his classic monograph, *The American Bisons* (Cambridge, 1876). One is *Bison priscus*, a very large, long-horned species, widely distributed in the Pleistocene formations of Europe. Another, named *Bison antiquus*, is found fossil in northern America and is so closely similar that Allen thinks the two might have been local races of a then circumpolar species. Both of these are regarded by some naturalists as direct ancestors of the modern forms. The third is *Bison latifrons*, a more ancient type (yet belonging to the era preceding the present), which was of gigantic size, with horns that must have spread 10 or 12 feet—three to four times that of any other species.

The Aurochs, *bonasus*, or zubr, has the general form of this type, and an old male stands about 6 feet high. The color is brown, much darker in the long hair of the fore parts than in the short wool of the sides and flanks. The horns are about 18 inches long, tapering, spreading, and a little curved inward at the point, and the tail is long and heavily tufted. Once widely distributed over continental Europe and Transcaucasia (avoiding the Russian steppes), it would long ago have become extinct were it not that guarded bands, numbering in 1898 about 700 individuals, have been protected in the imperial forest preserves of Bialowica in Lithuania, while a few hundred more roam semiwild in the fastnesses of the Caucasus. It has never been really domesticated, though several experimental crossings have been made between it and tame cattle, the results of which have not been important. It is said to exhibit aversion to association with other cattle and to retain its ancestral wildness and shyness with great tenacity. It moves about in small bands, which are easily provoked to anger, and become dangerous by the swiftness of their movements and the overpowering force of their weight in a charge. Its food consists of grass and brushwood and the leaves and bark of young trees. Its cry is peculiar, "resembling a groan or grunt more than the lowing of an ox." It does not attain its full stature till after its sixth year, and lives for about 30 or 40 years.

The AMERICAN BISON, more familiarly known as the "buffalo," is a slightly smaller, less massive animal than the aurochs, with more slender hind quarters, a shorter tail, and somewhat shorter and more robust horns, but with a higher hump and greater shagreenedness about the head and shoulders. The females are greatly inferior to the males in bulk, Audubon giving the weight of an old bull as nearly 2000 pounds, while full-grown, fat females will weigh only 1200 pounds. In habits it differs broadly from the aurochs in being highly gregarious, the nature of the country permitting it to gather into enormous herds, and in being almost exclusively a grazer.

"The habitat of the bison," according to Allen, "formerly extended from the Great Slave Lake on the north, in lat about 62°, to the north-eastern provinces of Mexico, as far south as lat 25°. Its range in British North America extended from the Rocky Mountains on the west to the wooded highlands about 600 miles west of Hudson Bay, or about to a line running southeastward from Great Slave Lake to the

BISONS



1. AMERICAN BISON or BUFFALO (*Bison americanus*). 2. EUROPEAN BISON or AUROCHS (*Bison bonasus*).

Lake of the Woods. Its range in the United States formerly embraced a considerable area west of the Rocky Mountains, its recent remains having been found in Oregon as far west as the Blue Mountains, and farther south it occupied the Great Salt Lake basin, extending westward even to the Sierra Nevada Mountains, while . . . until about 1830 it existed over the headwaters of the Green and Grand rivers and other sources of the Colorado. East of the Rocky Mountains its range extended southward far beyond the Rio Grande, and eastward throughout the region drained by the Ohio River and its tributaries. Its northern limit, east of the Mississippi, was the Great Lakes, along which it extended eastward to near the eastern end of Lake Erie. It appears not to have occurred south of the Tennessee River and only to a limited extent east of the Alleghenies, chiefly in the upper districts of North and South Carolina."

Restriction of range and decrease in numbers quickly followed the settlement of the interior. By 1800 it had disappeared east of the Mississippi; by 1850 it had been confined to the region of the dry plains; by 1875 it had been swept away from the central plains and limited to the region of northwestern Texas and western Kansas in the south, and in the north to Montana and northward, where isolated herds survived, with rapid diminution, until 1888, when the last remnant of the southern herd was nearly extinguished in the "Panhandle" of Texas, by the capture of the last specimens by C. J. Jones (consult Inman, *Buffalo Jones: Forty Years of Adventure*, Topeka, 1890). Small scattered bands remained a few years longer in isolated retreats, but the end of the century saw none in freedom south of the North Saskatchewan. There the extensive and lonely forests south of Great Slave Lake are still tenanted, sparingly, by the forest-ranging, larger, and darker variety known as the wood buffalo (subspecies *Athabasca*), which up to the recent establishment of preserves, was steadily being reduced by the Indians in spite of the efforts of Canadian officials. This is the result of a century of unexampled waste of one of the most numerous, interesting, and valuable animals in the world, and it is an irretrievable national disgrace. The last census, however, of this splendid animal is most encouraging. The species seems reasonably secure against immediate extermination, thanks to recent efforts on the part of the United States and Canadian governments, the New York Zoological and the American Bison societies. In 1889 the American bison reached its lowest ebb, when there were only 835 wild and 256 captive head. There are three centres of wild bison—the Yellowstone Park, the Montana Bison Range, and northern Athabasca. With the preserved herds in Yellowstone Park, the Montana, and Wichita ranges, the Canadian reserves, together with animals in captivity, there were 3453 full-blooded American bison in North America in January, 1913. For full particulars, consult Allen's *Monograph*, heretofore cited; W. T. Hornaday's "Extirmination of the American Bison," in the *Annual Report of the Smithsonian Institution for 1887*; *Our Vanishing Wild Life*, also by Dr. Hornaday (New York, 1913); and especially the *Annual Reports of the American Bison Society*.

The American bison was preëminently gregarious, and on the western prairies and plains

assembled in herds of thousands and even millions of individuals. So numerous were they that the early travelers on the plains might travel for days without losing sight of them; wagon trains, and even the first railroad trains, were sometimes compelled to stop and wait for their passage; and the present writer has seen steamboats halted by herds swimming the upper Missouri. These vast herds were made up of coherent bands, which had the habit of marching in files, and the paths thus made, called "buffalo trails," are still traceable on the arid plains; also the circular "wallows" where they rolled and spun in taking a dust bath. Each band was accompanied by bulls which, when alarmed, formed a defensive circle, with lowered heads, about the cows and calves, to protect them from the attacks of the bands of wolves that followed the herds, preying upon the weaklings, or from onslaughts by a puma or a bear; the grizzly alone was able sometimes to vanquish a buffalo in single combat. During the mid-summer rutting season the bulls were constantly fighting with one another also. The sexes remained together throughout the year, with the exception of an occasional solitary and morose bull. A single calf was the rule, born in spring, after a gestation of about nine months. The molting of the winter's woolly undercoat occurred early in summer, the hair coming off in great flakes; and the hide was in good condition for robes from October till May.

The buffaloes were nomadic, wandering in search of pasture, and certain annual migratory movements took place under the influence of regional or seasonal changes in forage or weather. In such movements they swam large rivers fearlessly and climbed mountains or made their way over rough ground with amazing agility. As a rule, however, they chose the easiest routes, and their trails were excellent guides to both travelers and engineers. One great defect in their character was their liability to panic, when the whole herd would rush headlong into a bog or over a precipice, taking no heed of the fate of those in front.

The Indians of the open interior region subsisted mainly upon the buffalo and were able to retain their independence as long as it was numerous. The flesh was excellent beef, and was sun-dried in vast quantities for transportation; and the hides served as material for lodges, winter clothing, harness, boats (in the form of coracles on the Missouri), shields, etc. Various uses were found for the sinews, bones, and horns, while the dung or "chips" formed the fuel of the plains. The Indians hunted it in companies, usually mounted, but sometimes on foot or on snowshoes, when various stratagems were employed to aid them. The simple chase on horseback was most exciting and perilous. When large amounts of meat were desired for winter stores, or for making pemmican, pounds were constructed, with guiding fences. At the entrance to the trap or inclosure a sudden pitch, natural or dug, would compel the animals to leap down, whence they could not return and could easily be slaughtered. This was feasible only in a somewhat wooded region. Another method was for a party of men to ride round and round a herd until they were crowded into a bewildered, stationary mass and then kill them at leisure. White men at first hunted the buffalo for food, and thousands were recklessly killed for the sake of a single slice from the

hump or a tongue. Their hides early became an article of commerce, and the Indians were encouraged to procure them for the traders. To this there was added, from about 1860 onward, an army of white hide hunters, who made a business of following and ruthlessly slaughtering the animals and succeeded so well that careful estimates show that on the average 2,000,000 hides a year were sent to market between the years 1865 and 1875. For these they received on the average no more than \$1, out of which sundry expenses must be paid. Subsequently, as the product diminished, prices rose, but never very greatly, and robes continued to sell up to 1890, in Eastern cities, for from \$15 to \$40, and the few remaining are not greatly advanced in price.

A great number of poor hides were tanned for leather, but it was porous and of no great value. The coarse fleece has been spun, and small quantities of it have been made into a soft cloth used for gloves, etc.—a service certain Indians found for it prehistorically. The early settlers in the Mississippi valley looked upon the buffalo as likely to prove domesticable and of great service, but although easily subjugated when taken young, it has not proved docile and of practical use, nor have the hybrids frequently produced between it and domestic cattle shown such qualities as make them desirable. See BUFFALO.

BISPHAM, bis'pam, DAVID (1857-) An American singer, born in Philadelphia, Pa., and educated at Haverford College. He studied in Florence under Vannucini and in London under William Shakespeare and in 1891 made his professional debut at the Royal English Opera, London, as the Duc de Longueville in *La Bascioche*. Following 1892 he sang in Italian, German, and English, as the principal barytone of the Royal Opera, Covent Garden, London. At the Metropolitan Opera House, in New York City, he appeared as the chief Wagnerian barytone. His remarkable success as a concert singer led him to abandon the operatic stage. He is known as one of the strongest advocates for the use of the English language and was the first of the great singers to employ English translations in his recitals of German songs.

BISSAGOS, bis-sa'gós, or **BIJU'GA ISLANDS** (from a negro tribe *Buyago*, or *Byyaga*, inhabiting several of the islands). A group of small volcanic islands, off the west coast of Africa, in lat 11° N and long 16° W, opposite the mouth of the Rio Grande. Sixteen of the islands are large and contain fine harbors. About half of the islands are inhabited by negroes under the dominion of native chiefs. The climate is unhealthy, but the vegetation is rich. Orango is the largest island. The chief town, Bulama, has a population of over 3700. The group is a dependency of Portuguese Guinea (Map Africa, C 3).

BISSÃO, bé-sour', or **BISSEO** The chief port of Portuguese Guinea (qv).

BISSEL, GEORGE EDWIN (1839-) A prominent American sculptor. He was born at New Preston, Conn., Feb. 16, 1839, the son of a successful quarryman, and was educated at the Northville Academy, and in Washington, Conn. He enlisted very young in the Civil War as a private in a Connecticut regiment and served during 1862-63. When his regiment was mustered out he was appointed assistant paymaster of the United States navy, serving from 1863 to

1865. At the end of the war he joined his father and brother in the marble business in Poughkeepsie, N. Y. Without artistic training, he furnished designs and models for public monuments, and at the age of 32 received his first order for a marble statue. His youthful experience thus gave him a facility in marble cutting often lacking in the modern sculptor. In 1875-76 he studied at Paris, Florence, and Rome, and on his return began as a portrait sculptor. Since that time he has steadily progressed, keeping in touch with the best work done abroad. From 1884 to 1896 he maintained an atelier in Paris, where he passed much of his time, he had another in Florence in 1903-05 and 1907-09. He has executed a great number of soldiers' monuments, of which the best is at his old home, Waterbury, Conn., where also is his statue of Col. John L. Chatfield. Among his other works are a bronze statue of Chancellor John Watts in Trinity churchyard, New York City, considered his masterpiece, Col. Abraham de Peyster (1896) at Bowling Green, New York City, a monument to Abraham Lincoln in Edinburgh, a marble statue of "Lycurgus" on the Appellate Courthouse, New York, Chancellor James Kent, in the Congressional Library, Washington, the remarkable Elton Memorial Vase at Waterbury, Conn., and a bronze statue of Abraham Lincoln, Clermont, Iowa. His art is characterized by a sturdy realism and remarkable adaptability to the material used.

BISSELL, EDWIN CONE (1832-94). An American biblical scholar. He was born at Schoharie, N. Y., March 2, 1832, and graduated at Amherst College (1855) and at Union Theological Seminary (1859). He served as a Congregational pastor at Westhampton, Mass., San Francisco, Cal., Winchester, Mass., and was a foreign missionary of the American Board of Commissioners for Foreign Missions at Innsbruck, Austria (1874-79). In 1881 he became professor of Hebrew in the Hartford Theological Seminary (Congregational), then in the McCormick Theological Seminary (Presbyterian) in 1892. He was captain of Company H, Fifty-second Massachusetts Volunteer Regiment (1862-63), while still pastor of Westhampton, and stated supply at Honolulu, Oahu, 1869-70. Among his works are *The Historic Origin of the Bible* (1873), *The Pentateuch: Its Origin and Structure, An Examination of Recent Theories* (1885), *Biblical Antiquities* (1888, 2d ed., 1892), *A Practical Introductory Hebrew Grammar* (1891), *Genesis, Printed in Colors, Showing the Original Sources from which it is supposed to have been compiled, with an Introduction* (1892). But his best work was his volume on *The Apocrypha of the Old Testament, with Historical Introductions, A Revised Translation, and Notes Critical and Explanatory* (1880), which Dr. Schaaf incorporated in his edition and translation of *Lange's Commentary*.

BISSELL, WILSON SHANNON (1847-1903). An American lawyer. He was born in New London, Oneida Co., N. Y., graduated at Yale, studied law in Buffalo, and in 1872 began practice with a law firm to which, in 1873, Grover Cleveland was admitted. On the election of Cleveland as Governor of New York, Bissell became the senior partner of a newly organized firm, confining his legal work to corporation practice. In 1890 he was appointed a commissioner to propose amendments to the judiciary articles of the New York constitution. From 1893 to

1895, during Cleveland's second administration as President, Bissell was Postmaster-General of the United States. In 1902 he became chancellor of the University of Buffalo.

BISSEN, HERMANN VILHELM (1798-1868). A Danish sculptor. He was born in Schleswig, Oct. 13, 1798, and studied first in Copenhagen, where in later years (1850) he was made director of the Academy of Arts. In 1823 he took the great gold medal and was sent to Rome to work under Thorvaldsen, with whom he studied 10 years. Among the works of his early period are a marble "Psyche" and similar subjects in the Glyptothek Ny Karlsberg. Commissioned by the will of Thorvaldsen to complete his work, he modeled the well-known Gutenberg monument at Mayence after the master's sketch. After his return to Copenhagen he carved in Kristiansborg Palace a frieze 134 feet long, destroyed by fire in 1884. About 1850 the character of his art changed, becoming more realistic. He designed many military monuments, among the best of which are the "Victorious Soldier" at Fredericia; the statue of Frederick VI (1856, Friedericksbergave); the equestrian statue of Frederick VII, facing Kristiansborg. Of a more ideal character are the "Maiden Bathing" (1859), "Shepherd's Boy" (1868), and "Moses," in front of the Fruekirch. His productivity was enormous. The royal collection in Copenhagen possesses 100 bronze busts, besides numerous marble statues, plaster casts, etc.

BISSEXTILE (Lat. *bissextilis*). The old name of leap year. In the Julian computation a day was added to February every fourth year; but instead of making it, as now, the 29th, the 24th day of the month was counted twice (*bis*), and as that day was the sixth (*sextus*) before the calends of March, it was called *bis-sextilis*. See CALENDAR.

BISTER, bis'tér (Fr. *bistre*, dark brown). A blackish-brown color, often made of moistened wood soot mixed with a little gum. It was often used by the old masters for tinted drawings and shaded sketches.

BISTINEAU, bis'té-nô'. A lake in the northwestern part of Louisiana, about 25 miles southeast of Shreveport; it is over 25 miles long and has an average width of about 2 miles. It receives a number of streams, mainly from the north, and discharges its water through the Red River, with which it is connected by a short river. It is navigable for river steamboats.

BISTORT (Lat. *bis*, twice + *tortus*, twisted; referring to its root)—*Polygonum bistorta*. A perennial plant, 1 to 1½ feet high, with a simple stem, ovate subcordate and wavy leaves, the radical leaves tapering into a long petiole, and one dense terminal cylindrical spiked raceme of flesh-colored flowers. The root is about the thickness of the little finger, blackish brown externally, reddish within, and tortuous (whence the name "bistort"). The whole plant is astringent, containing much tannin. Bistort is a native of Europe and Asia.

BISTRITZ (Slav. *bystřa*, swift). A river rising in the Carpathian Mountains in eastern Hungary, flowing southeast through Bukovina and Moldavia, and joining the Sereth just below Bakau, after a course of about 185 miles (Map: Austria-Hungary, K 3). It is called the Golden Bistritz on account of the auriferous character of its sands.

BISTRITZ (Hung. *Bessterce*). A royal free

town and the capital of the county of Beszterce-Naszdó, of Transylvania, in Saxonland, Kingdom of Hungary. It is beautifully situated on the Bistritz River, an affluent of the Szamos, in a fine valley about 50 miles northeast of Klausenburg (Map: Austria-Hungary, J 3). Lumbering and milling are the chief industries. Near the town are the ruins of a castle once the residence of the famous John Hunyady. Pop., 1900, 12,081; 1910, 11,966, mostly Germans. In 1848-49 Bistritz was the scene of fierce fighting between the Austrians and the Hungarians. The town was formerly called Nüsen, giving its name to Nüsen Land.

BITANGENT. A tangent which touches its curve in two distinct points. The general bi-quadratic plane curve has 28 such double tangents. For their theory, consult Salmon, *Treatise on the Higher Plane Curves* (Dublin, 1852; 3d ed., 1879).

BITHUR, bêt-hoor', or **BITHOOR**. A town of India, in the Cawnpore district, United Provinces of Agra and Oudh, on the right bank of the Ganges, 12 miles northwest of Cawnpore (Map: India, D 3). It is particularly devoted to the worship of Brahma, has numerous pagodas and elaborate ghats, and is a favorite pilgrim resort for purposes of ablution. During the mutiny of 1857 Bithur was the stronghold of Nana Sahib. Here Havelock more than once exacted retribution, defeating the Nana in the field and burning his fort. Pop., 1901, 7173; 1911, 4386.

BITHYNIA, bi-thin'i-á (Gk. *Bithynia*). An ancient division of Asia Minor, separated from Europe by the Propontis (Sea of Marmora) and the Thracian Bosphorus (Strait of Constantinople). It was bounded north by the Buxine, south by Galatia, Phrygia, and Mysia, and east by Paphlagonia. It contained the famous Greek colonies of Chalcedon and Heraclea, Pontica; at a later period, Nicomedia, Nicæa, and Prusa were the chief cities. The inhabitants of Bithynia were supposed to be of Thracian origin; from Thracæ two kindred tribes, the Thyni and the Bithyni, migrated to Asia Minor. Though for the most part mountainous, Bithynia has some fertile plains. The Olympus Range reaches a height of 7600 feet. The chief rivers were the Sangarius, the Rhyndacus, the Biliaeus, and the Partherius. The country is still well wooded, and has valuable natural resources, as yet undeveloped (see CHALCEDON; HERACLEA). It was subdued by Cæsar of Lydia and later fell under the Persian dominion, though the native princes seem to have been left in power. In the confusion which followed the death of Alexander the native dynasty secured an independent position, and in 297 B.C. Zipoites seems to have assumed the title of King. His son Nicomedes I founded in 264 B.C. the city of Nicomedia, which became the capital. Prusa was founded about 185 B.C. by King Prusias I, and was for a time the chief city. The last King, Nicomedes III, made the Romans his heirs, and, with a large addition from the Pontic Kingdom, Bithynia became a province of the Republic (74 B.C.). Under Trajan, Bithynia was governed by Pliny the Younger (103-105 A.D.), whose letters (x. 98-97) to the Emperor on the administration and condition of the province contain the well-known passage respecting the Christians. The Emperor Diocletian made Nicomedia his habitual residence. In 1298 Osman the Turk broke into the country, and in 1328 Prusa or Brusa, then

the chief town of Bithynia, became the capital of the Kingdom of the Osmanli, and in its mosque are the tombs of the earliest Sultans. Consult Ramsay, *Historical Geography of Asia Minor* (London, 1890). See BRUSA, NICÆA, NICOMEDIA.

BITING LICE, or **BIRD LICE**. See MALLOPHAGA.

BITLIS, bit-lès' A town of Asiatic Turkey, capital of the vilayet and sanjak of the same name. It is situated at an elevation of 5156 feet above the level of the sea, in a deep ravine traversed by the river Bitlis, a tributary of the Tigris, near Lake Van (Map Turkey in Asia, K 3). Bitlis is scattered and irregularly built, with a large number of mosques, convents, several well-stocked bazars, a palace, and ruins of an old fortress. It carries on an active trade in raw wool, tobacco, cotton fabrics, arms, and gold and silver articles. The population is approximately 39,000, about one third of whom are Armenians. The Persians defeated Solyman the Magnificent near Bitlis in 1554.

BITOLIA. Another name for the Macedonian city, Monastir (q v).

BITONTO, bë-tôn'tô (anciently Lat *Butuntum*). A city in south Italy, 5 miles from the Adriatic and 10 miles west of Bari (Map Italy, L 6). It has a Romanesque cathedral, a theological seminary, an orphan asylum, and a castle. The chief trade is in salad oil and in a wine called Zagarello. In its vicinity the Spardiars, under Count de Montemar, gained a victory over the Austrians in 1734, which gave Naples to Don Carlos. Pop. 1881, 23,812, 1901 (commune), 30,617, 1911, 33,003.

BITSCH, Fr **BITCHE** (anciently *Byths castuane*). A German town of Alsace-Lorraine, on the Horn, in a wild and wooded pass of the Vosges, 36 miles north-northeast of Strassburg (Map Germany, B 4). The citadel is built on a precipitous and isolated rock, 250 feet high, in the middle of the town. It has been made almost impregnable, is defended by 80 cannon, and has accommodations for a garrison of 1000 men. The Prussians, under the Duke of Brunswick, unsuccessfully attempted to surprise it in 1793, and in 1870 the Germans vainly besieged it after the battle of Worth. The town has manufactures of matches, watch glasses, and porcelain. Pop. 1900, 3600, 1910, 4290.

BITTENFELD, bit'ten-fêlt, HERWARTH VON. See HERWARTH VON BITTENFELD.

BITTER, KARL HERMANN (1813-85). A Prussian statesman and writer on music. He was born at Schwedt, province of Brandenburg, and studied law and cameralistics at Berlin and Bonn. He served as the plenipotentiary of Prussia on the Danube Commission from 1856 to 1860, was prefect of the department of Vosges during the Franco-Prussian War, and subsequently became Minister of Finance (1870), an office in which he displayed exceptional ability. He increased the indirect duties derived from the so-called tobacco monopoly and the tax on spirits and malt, introduced the "Borsensteuer" (tax on the bourse), and concluded the commercial treaty with the city of Hamburg by which that city entered the German Customs Union. He reestablished the stability of the Prussian finances and took a prominent part in bringing the railroads of Germany under government control. He resigned in 1882, in consequence of differences with Bismarck. His literary activity was confined almost exclusively

to works on music. His *Gesammelte Schriften* were published in 1884.

BITTER, KARL THEODORE FRANCIS (1867-) One of the foremost American sculptors. He was born at Rudolfsheim, near Vienna, Dec 6, 1867, and studied under August Kuehne and Edmund Heller in the Academy of Vienna. He came to the United States in 1889 and in the same year he was successful in a competition for the Astor Memorial bronze doors of Trinity church, New York City. Through the friendship of Richard Morris Hunt, architect, he received the commission for the decoration of the administration building of the Chicago Exposition, 1893, and a further commission for the manufacturers' building. By reason of the great success of these decorations he was appointed director of sculpture of the Buffalo Exposition of 1901, contributing himself the two colossal equestrian standard bearers. He was also chief of the department of sculpture at the St. Louis Exposition, to which he contributed the group "Louisiana Purchase." In the meanwhile, with marvelous facility, he contributed a mass of decorative sculpture for the great commercial buildings of New York and other cities, a good example being the series of colossal reliefs of the Pennsylvania Railway Station in Philadelphia. He also executed decorations for public buildings, such as the Chamber of Commerce and the Metropolitan Museum, New York, and for private houses, like the residences of George W. Vanderbilt in New York and in Baltimore, N. C., and those of C. P. Huntington and John Jacob Astor, New York. Most of this work was executed by a great number of assistants under his direction. Besides such decorative work he has during late years executed a series of bronze and marble statues of high technical ability and fine feeling, such as the memorial bust of Dr. Pepper in Philadelphia, and a series of monuments in New York—the beautiful nude Villard Memorial, the mysterious Hubbard Memorial called "Thanatos," the equestrian statue of Gen. Franz Sigel, and the memorial of Carl Schurz (1913), an admirably characterized statue of the great German-American, with very original granite reliefs. He is a member of the National Academy (1902), president of the National Sculpture Society, and of the National Academy of Arts and Letters. He received gold medals at Buffalo in 1901, Philadelphia in 1902, and St. Louis in 1904.

BITTER ALMONDS, OIL OF. See BENZALDEHYDE.

BITTER ASH. See QUASSIA.

BITTERFELD, bit'tër-fêlt. A town in the Prussian province of Saxony, about 20 miles north of Leipzig, on the Mulde (Map Prussia, E 3). There are manufactories of earthenware, piping, paper roofing, and machinery, also foundries, saw mills and coal mines in the vicinity. It is pleasantly situated on a junction of railways to Berlin, and is a popular residence of business men of Leipzig and Halle. Bitterfeld was founded in the twelfth century by the Flemings. Pop. 1890, 9047, 1905, 13,201, 1910, 14,617.

BITTERN (OE *bitoure*, bitter, from Fr *butor*, origin uncertain). Any heron of the genus *Botaurus* and related genera, once separated in the subfamily Botaurinae, but now considered to grade so completely into the other herons that no distinction can be recognized. Taking the extreme forms, bitterns are chiefly

distinguished from herons by the long, loose plumage of the sides of the neck, which they have the power of erecting at pleasure, along with the rest of their contour feathers, so as greatly to increase their apparent size. Bitterns also differ from most herons in the greater length of their toes, the middle toe being as long as the shank; in the presence of only two pairs of powder tracts, and in having only 10 tail feathers. They are almost all solitary birds, inhabiting reedy and marshy places, where they remain during the day, and will almost allow themselves to be trodden upon before taking wing; they feed during the night on frogs and partly, also, on fish, lizards, water insects, etc., and even small birds and quadrupeds. The claw of the middle toe is serrated on the inner edge, probably to aid in securing slippery prey. The common bittern of America (*Botaurus lentiginosus*) is a bird very widely diffused over the whole continent of North America. In size it varies greatly, from 2 to 3 feet in length, and it has an expanse of wing up to nearly 4 feet; the bill is about 3 inches long. The feathers on the crown of the head are dull brown, and the plumage in general of a dull, tawny color, beautifully and irregularly marked and mottled with black and white. The bittern makes a rude nest of sticks, reeds, etc., in its marshy haunts, and lays four or five eggs (illustrated in the Plate of EGGS OF WATER AND GAME BIRDS). It has a peculiar bellowing cry, which has obtained for it such name as "stake-driver," "bull of the bog," etc., and many of its appellations in other languages, perhaps even its name "bittern" (*bifour*, *butor*, *botaurus*). Some naturalists used to assert that the booming cry of the bittern was produced by the bird inserting its bill into a reed or into the mud, but that notion has long since been exploded.

This bird's spring notes are, however, very remarkable, making a booming which has been aptly compared to the noise made by an old wooden pump handle. When assailed, it fights desperately with bill and claws; and it is dangerous to approach when wounded, as it strikes with its long, sharp bill, if possible, at the eye. The bittern of Europe (*Botaurus stellaris*) is very similar to that of America, but differs in having the crown black and in some other details of color; the eggs also are different, being greenish brown. It is a common bird throughout Europe, Asia, and Africa. The Australian species (*Botaurus australis* or *pacioplilus*) is generally distributed throughout Australia, wherever marshes or sedgy rivers occur. In habits it closely resembles the bittern of Europe. The head and upper parts generally are purplish brown, except the wings, which are buff, conspicuously freckled with brown; the throat, breast, and belly mottled brown and buff. The so-called sun bittern (q.v.) is a South American bird allied to the cranes.

LEAST BITTERN.—Nearly allied to the bitterns are birds of the genus *Ardetta* or *Ixobrychus*, commonly known as "least bitterns." So similar are they to *Botaurus* that they are included in that genus by some ornithologists. They are more highly colored and are about a foot in length. The genus as represented by 10 species is very widely distributed over the world, but the birds are rarely seen because of their retiring habits, and the fact that they live in reedy swamps, where they are easily hidden. The

most common North American species is *Ardetta*, or *Ixobrychus*, *exilis*.

BITTERN, BITTER LIQUID, or OIL OF SALT. A term applied primarily to an oily liquid, obtained in salt manufacture, left when the mother liquor of the evaporating pans ceases to deposit crystals of common salt, but also applicable to some natural brines of high concentration. Examples of the latter are the water of the Dead Sea, of Elton Lake in southern Russia, and Red Lake in the Crimea. Bitterns consist principally of a strong solution of common salt, along with variable amounts of the chlorides of magnesium and calcium, as well as bromine and iodine. The bittern obtained from the salt works of Epsom was at one time the source of the sulphate of magnesium (hence called Epsom salts). They sometimes serve as commercial sources of calcium chloride, as in southeastern Ohio, and bromine, as in Michigan, West Virginia, and Germany. See SALT; BROMINE.

BITTERNUT. See HICORY.

BITTERS. A term applied in popular speech to beverages containing alcohol and either aloes for a cathartic effect, or Angostura bark, gentian, calisaya, etc., for stimulating the appetite and digestion. Drugs classed as "bitters" in the Pharmacopœia are mild or pungent tonics or digestants, as follows: The "simple bitters" include quassia, gentian, calumba, and eupatorium (boneset); the "aromatic bitters" include chamomile, cascarella, angostura, and cimicifuga (snakeroot). Wild cherry, cinchona, and picric acid are also classed as bitters, but have other special and distinctive qualities.

BITTER SPAR. See DOLOMITE.

BITTERSWEET, DULCAMARA, or WOODY NIGHTSHADE (*Solanum dulcamara*). A plant found in hedges and thickets in most parts of Europe and in Asia, and introduced in the United States. The root is perennial; the stem climbing and shrubby, many feet in length; the leaves ovate heart-shaped, the upper ones spear-shaped; the flowers, purple or blue, in drooping cymes, much resembling those of its congener the potato, but much smaller, followed by ovate red berries of tempting appearance, are not unfrequently the cause of serious accident, particularly to children. The twigs are collected in autumn after the leaves are fallen. The fluid extract prepared from the twigs possesses the power of blunting to some extent sensibility to pain and of considerably increasing the secretions of the skin, the kidneys, etc. The extract is employed in medicine chiefly as a remedy for scaly eruptions on the skin. Its principal chemical constituents are resin, gum, the alkaloid solanine, and the glucoside dulcamarin. *Oelasturus scandens*, a woody vine, is also called bittersweet in the United States. See SOLANUM; and Plate of POISONOUS PLANTS.

BITTER VETCH. See OROBUS.

BITTERWOOD. A name given to certain species of the genus *Xylopia*, trees and shrubs remarkable for the bitterness of their wood, particularly the West Indian *Xylopia glabra*. Furniture made of this wood is safe from the attacks of insects. The genus *Xylopia* belongs to the family Anonaceæ. The fruit of some of the species, particularly *Xylopia sericea*, is highly aromatic and pungent like pepper. *Xylopia sericea* is a large tree, a native of Brazil; its bark is used for making excellent cordage.

Bitterwood is also the name of *Picramnia ea-*

celso, formerly called *Quassia excelsa* and *Simaruba excelsa*, a tree of the family Simarubaceae, a native of Jamaica, the wood of which is used in medicine. It is nearly allied to the true quassia and possesses very similar properties, containing the crystallizable bitter principle called quassin. The wood, which is intensely bitter, is a very useful stomachic and tonic, if introduced into the rectum, it acts in certain cases as an excellent anthelmintic. An infusion of bitterwood is also a well-known and useful fly poison, and it appears to act as a powerful narcotic on many quadrupeds.

BITUMEN (Lat. a kind of mineral pitch). A name applied to a number of inflammable mineral substances varying in chemical composition and ranging in consistency from solid to gaseous. The bitumens consist mainly of compounds of carbon and hydrogen, but usually they contain also small amounts of sulphur, oxygen, and nitrogen. The most important substances, included under the name are natural gas, petroleum, maltha, asphalt, elaterite, wurtzite, albertite, grahamite, gilsonite, and ozocerite. Natural gas is composed mostly of marsh gas, with small quantities of other hydrocarbons. Petroleum and naphtha and the solid bitumens are essentially hydrocarbon compounds, containing also subordinate amounts of sulphur, oxygen, and nitrogen, and other elements which may be regarded as impurities. The bitumens are widely distributed over the earth's surface and occur endogenous in all the geological formations from the Ordovician to the present. Their origin in most cases can be traced to the decomposition of vegetable or perhaps also animal matter, but various other theories have been advanced to account for the deposits of petroleum and natural gas. The several bitumens are described in special articles. See **ASPHALTIC COAL**, **GAS** (NATURAL), **NAPHTHA**, **PETROLEUM**, **ASPHALT**, **BITUMINOUS LIMESTONE**, **BITUMINOUS SHALES**, **ELATERITE**, **ALBERTITE**, **GRAHAMITE**.

BITUMINOUS COAL (Lat. *bituminosus*, from *bitumen*, a kind of mineral pitch, bitumen). A term applied to the varieties of coal containing usually from 30 to 40 per cent of volatile matter. They yield by destructive distillation a considerable quantity of gas, easily purified and with good illuminating qualities, and are consequently largely used for that purpose. Some varieties also coke when heated out of contact with the air and yield a hard, porous product known as coke. See **BLACK COAL**, **CANNEL COAL**, **COAL**, **COKE**.

BITUMINOUS LIMESTONE. A limestone impregnated and sometimes deeply colored with bituminous matter (either petroleum or asphalt) derived from the decomposition of animal and plant remains entombed within the mass or in its vicinity. The amount of bituminous matter or asphalt in the pores of the rock is sometimes sufficient to permit the material being used for asphalt pavements after simply powdering and heating it. Still better results are obtained by mixing it with bituminous sandstone. In the United States bituminous limestone occurs in Oklahoma, Texas, and Utah. Much bituminous limestone is also mined in Germany, Switzerland, and France, whence it is sometimes brought to the United States. See **ASPHALT**, **PAVEMENT**, **ASPHALTIC COAL**.

BITUMINOUS SANDSTONE. A sedimentary rock of siliceous character, containing more

or less asphalt or other bituminous material in its pores. When rich in bitumen, it is a valuable economic product, sometimes it is used directly as a paving material, but more often it is previously subjected to a process of refining. In the United States it is known in California, Kentucky, and Oklahoma, but the deposits are not extensively worked. Consult the volumes of *The Mineral Industry*, especially vol. VIII (New York, 1900), and Ries, *Economic Geology* (New York, 1910). See **BITUMEN**, **ASPHALT**.

BITUMINOUS SHALES. The term properly applies to a shale containing considerable bituminous matter. It is of no value for fuel purposes, but may serve as a source of oil. See **OIL SHALE**.

BITURIGES, bi-tŭ'ri-jĕz. The Latin form of the name Bourges (q.v.).

BITZIUS, bit'si-us, ALBERT (1797-1854). A Swiss author, known also by his pseudonym, *Jeremas Gotthelf*. He was born at Muten (Freiburg), studied at Göttingen, and was pastor at Lutzelfuh in Emmental from 1832 until his death. His first work, *Bauernspiegel, oder Lebensgeschichte des Jeremas Gotthelf von ihm selbst berichtet* (1837), under his pseudonym, written with a strong ethical purpose, giving a picture of the village life of Emmental in the Canton of Bern, was very successful. It is written in the dialect of the region, as are his subsequent writings, which include *Leiden und Freuden eines Schulmeisters* (1838-39), *Uli der Knecht* (1841), English version, *Ulio the Farm Servant* (1888), by Julia Firth, with preface and notes by John Ruskin, *Uli der Pächter* (1849), *Erlebnisse eines Schuldenbauers* (1854). His complete works were published in 24 volumes (1856-61), and in 4 volumes (1894-96).

BIVALVES. A common name for the class of mollusks known scientifically as Pelecypoda (q.v.).

BIVOUEAC, bi-vŭ'āk (Fr. probably from *Gen. Bivouache*, *Bewacht*, from *ber*, by + *Wache*, watch, guard), MILITARY. An encampment of soldiers in the open air, generally of a temporary nature. In active service and in an enemy's country great care must be exercised in the choice of ground for a bivouac. It must offer few (if any) advantages to an enemy, be near water facilities for men and animals, be capable of hasty defense, and out of range of artillery fire. Bivouacs are generally for the night only and are so arranged that the troops may resume the formation in which they were halted with the least delay, and without confusion. See **ENCAMPMENT**, **CAMP**, **MILITARY**, **CANTONMENTS**.

BIWA, bi-wā. A beautiful lake in the southern part of the island of Nippon, Japan (Map Japan, E 6). It is about 36 miles long, 12 miles in width, and lies at an altitude of about 400 feet. The western shore is mountainous and the eastern is low. There are several small islets in the lake. Chikubu-shima is the most important. Fish is found in abundance. Biwa is connected by several canals with the inlet of Osaka and supplies water power to the mills and factories in Kyoto.

BIXBY, JAMES THOMPSON (1843-) An American Unitarian minister. He was born at Barre, Mass., July 30, 1843, graduated at Harvard College and at Harvard Divinity School, entered the ministry, and was settled in various

parishes, his last being at Yonkers, N. Y. He was professor of the philosophy of religion in Meadowville Theological School from 1879 to 1883, when he went abroad for study and travel, and in 1885 received the degree of Ph.D. at the University of Leipzig. He is the author of *Similarities of Physical and Religious Knowledge* (1876; 2d ed. under the title *Religion and Science as Allies*, 1895); *The Crisis in Morals; Examination of Rational Ethics in the Light of Modern Science* (1891; 2d ed. under the title *The Ethics of Evolution* (1900); *The New World and the New Thought* (1902).

BIXBY, WILLIAM HERBERT (1849-). An American army officer, born at Charlestown, Mass. He attended the Massachusetts Institute of Technology for one year, graduated from the United States Military Academy in 1873, and served as assistant professor of engineering at the Academy for four years. In 1881 he was sent to France to attend the French government school of bridges and highways. He rose through the various grades to be brigadier general in chief of the engineer corps (1910). He was president of the Mississippi River Commission in 1908-10, supervised the raising of the battleship *Maine* in Havana harbor, and in 1913, after 40 years of service, retired. He prepared *A Graphical Computing Table* (1879), various reports, and (1911) a *Discussion of River and Harbor Improvements*.

BIX'IN. See **ARNOTTO**.

BIXIO, bek'sé-ô, GIROLAMO (called *Nino*) (1821-73). An Italian patriot, born in Genoa. He was the brother of Jacques-Alexandre Bixio. He participated in the unsuccessful struggle of the Venetians against Austria and, after joining Garibaldi in Rome (1848), commanded the Roman troops that repulsed the first attack of the French General Oudinot (1849). He commanded one of Garibaldi's vessels during the expedition to Sicily in 1860, and after capturing Reggio and fighting in the battle of Volturmo (1860) was made lieutenant general. He served in the War of 1866, in 1870 forced the capitulation of Cività Vecchia, and took part in the capture of Rome. In 1866 he was elected to the Chamber of Deputies and in 1870 was called to the Senate. He died in the East Indies, where he had gone in charge of a commercial expedition. Consult: Guerzoni, *La vita di Nino Bixio* (Florence, 1875); Delveccio, *Cenni biografici di Nino Bixio* (Genoa, 1887); C. Martinengo, *Patrioti italiani* (Milan, 1890); C. C. Abba, *La Vita di N. Bixio* (Turin, 1905).

BIXIO, JACQUES-ALEXANDRE (1808-65). A French publicist and politician, born at Chiavari, then in the department of the Apennines. He was concerned in the Revolution of 1830 and in 1848 was influential as a leader of the Opposition. Under Louis Napoleon he received various political honors. His political career ended with the coup d'état of 1851, and from this time he devoted himself to agricultural affairs, and established the Library of Agriculture, to which he gave a part of his fortune. In 1831 Bixio, with Buloz, founded the *Revue des Deux Mondes*.

BIYSK, bĕsk. A district town in the government of Tomsk, Siberia, situated on the river Biy, 300 miles south of Tomsk, and 1900 miles east of Moscow (Map: Asia, H 3). A pass across the Altai Mountains favors a brisk trade with the Chinese and the Altai Kalmucks; hardware, printed cloth, leather, soap, tobacco, etc., are exchanged for cattle and hides. The

hides are dressed in the tanneries of Biysk and resold to the Mongols. Pop., 1897, 17,200.

BIZERTA, bi-zér'tà, or **BENZERTA**, ben-zér'tà (Lat. *Hippo Diarrhytus* or *Zarytus*, Gk. Ἰππὸν Ζάρρυτος, *Hippôn Zarrhytos*, from Phœnician *hippo*, a walled town + Gk. διάρρυτος, *diarrhytos*, intersected by streams). A fortified seaport of Tunis, 38 miles northwest of the capital, Tunis, at the mouth of a lagoon communicating with a deep gulf or bay of the Mediterranean (Map: Africa, E 1). In ancient times it was one of the best ports on the Mediterranean. The harbor later became obstructed, and when the French took possession, in 1881, they dredged the channel and built breakwaters. On account of its strategic position it is now an important naval base of France. The harbor contains a fully equipped navy yard and arsenal and has a 30-foot channel. Its trade is still in embryo, but is growing rapidly, and consists of produce, cereals, olive oil, and fish, the last being the most important. The town is surrounded by walls and defended by two castles and batteries placed on the neighboring hills. Hippo Diarrhytus, or Zarytus, was founded by the Tyrians. Agathocles, between the years 310 and 307 B.C., fortified the place and provided it with a new harbor, and under the Romans it was a free city. Pop. (est.), 17,300.

BIZERTA, or **BENZERTA**, LAKES OF, the ancient *Hyponitis Palus* and *Sisara Palus*. Two lagoons in Tunis, lying south of the town of Bizerta, whence they derive their name. They abound in fish, especially mullets, from the roes of which *botargo*, an important article of Levantine trade, is manufactured.

BIZET, bè-zé' (ALEXANDRE CÉSAR LÉOPOLD) GEORGES (1838-75). A French operatic composer. He was the son of a singing master in Paris and was generally regarded as a child prodigy. At nine he entered the Conservatoire, where his masters were Marmontel in piano, Zimmermann in harmony, Benoist in organ, and his future father-in-law, Halévy, in composition. For a decade he carried off nearly all the Conservatoire prizes, and in 1857 his comic opera, *Le docteur miracle*, was awarded the palm over 60 other compositions in a competition established by Offenbach. Several months later he won the Prix de Rome, and the dream of his life was realized. He plunged into the study of the great Italian masters of Church music, at the same time broadening and deepening his mental and artistic equipment by voracious reading and constant visits to the museums and galleries in Rome. His letters of this period mirror faithfully the striking growth of the artist, and more unusual still, the modest consciousness of this growth. While in Italy he composed the opera *Don Procopio*, discovered in 1895 among the papers of Auber; two movements of a symphony, and a comic opera, *La gusla de l'Emir*. He returned to Paris a finished composer, yet his opera *Les pêcheurs de perles*, a tale of Hindu love, was produced at the Théâtre Lyrique (1863) with no particular success. *La jolie fille de Perth*, based on Scott's novel, was more favorably received by the critics (1867). Bizet now accepted Wagner's contentions for dramatic verity in opera without accepting his methods of attaining it. These were the years of exoticism in music, which was inaugurated by Félicien David (q.v.), and at which Bizet had already tried his hand. *Djamileh* (1872), a one-act tragedy of unrequited love in the Orient, was

brushed away by the public as too Wagnerian and untheatrical, but the author was "absolutely sure that he had found his way, he knew what he was doing." Technical mastery, Gallic deftness and delicacy of touch, emotional depth and sincerity, were all concentrated in this tale of suppressed passion amid the languorous surroundings of a Cairo harem. Unlike David, with whom Orientalism was the aim and essence of the composition, Bizet employed it only as a background, an atmosphere for universal and eternal emotions. This little masterpiece was followed in the same year by the incidental music to Daudet's drama *L'Arlesienne*. The spirit of "fair Provence" was transmuted into tones with wonderful power. The public paid no attention to the *entr'acte* music, performed amid the chattering usual between the acts, and yet at present the music and the drama have grown to be considered as inseparable as is Mendelssohn's music from Shakespeare's *A Midsummer Night's Dream* or Beethoven's music from Goethe's *Egmont*. The discouraged composer tempted fortune for the last time with *Carmen* (1875), based on Mérimée's novel. Another failure, and in a few months the master died at Bougival, carrying to his grave the conviction that he had created a chef-d'œuvre—an opinion in which musicians of all schools and tastes concur at present, when *Carmen* is one of the half-dozen most popular operas of the lyric stage. "Dramatic and picturesque," *Carmen* delineates in masterly style the psychology of the wayward heroine from the whimsical coquetry of the first scene to the fatalistic bravado of the tragic denouement. The development of the choler in the weakening Don José, driven by Carmen's heartlessness to despair and murder, the purity and devotion of the lachrymose Micaëla, the pleasure-loving bullfighter—all these once seen and heard are never forgotten. Even the minor personages speak each an individual musical language.

Besides two overtures, Bizet wrote piano music and a number of songs, highly valued by connoisseurs.

Bizet was a remarkable reader of orchestral scores at sight, an erudite musician, a man of wide culture and strong artistic convictions. With all his admiration for the music drama, he did not overburden his *Carmen* with colossal orchestration, nor did he discard the time-honored set numbers and ensembles or make use of the *leit-motif*, except "remniscentially." The choice, too, of subjects for his last two works was in the direction of everyday realism, contrary to the theory that myth is the only subject for a music drama. France undoubtedly lost in Bizet one of her greatest musicians before he had achieved what was easily within his power to achieve. Consult C. Bellaigue, *Georges Bizet* (Paris, 1891), C. Pigot, *Bizet et son œuvre* (Paris, 1886), P. Voss, *Bizet* (Leipzig, 1899), A. Weissmann, *Georges Bizet* (Berlin, 1907), O. Séral, *Masters in Music: Bizet* (Boston, 1909).

BJERKNES, byærk'nés, VILHELM FRIMAN KOREN (1862-) A Norwegian physicist, born at Christiania, Norway. He was educated at the University of Christiania and also studied at Paris and Bonn. From 1893 to 1907 he was an instructor and professor at the University high school of Stockholm, and from 1907 to 1912 professor of mechanical and mathematical physics at the University of Christiania. In 1913 he became professor of physics at Leipzig.

His publications include "Fields of Force" in the *Columbia University Series* (1906) and *Dynamic Meteorology and Hydrography* (2 vols. 1910-11).

BJORCK, byërk, GUSTAV OSKAR (1860-) A Swedish genre and portrait painter. He was born at Stockholm and studied at the academy of that city under Perseus, and then for several years at Paris, Munich, Venice, and Rome, sketching during the summers at Skagen (Denmark). Among his early works are "A Timely Shot" (Museum of Copenhagen), "The Roman Smithy" (Cotcoran Gallery, Washington), "Vegetable Market in Venice" (1887, National Gallery, Stockholm). In 1889 he returned to Stockholm to become instructor in the academy, where he was appointed professor in 1893. His later works include "A Midday Meal in the Stable" (1890, National Gallery, Stockholm), a series of decorative paintings in the Opera, Stockholm (1895), and many portraits, including those of Oscar II and of Gustav V, in the palace at Stockholm, "Prince Eugene at his Basel" (National Museum, Stockholm), and Princess Ingeborg (1895). The chief characteristic of his paintings is a sturdy realism, his portraits are powerfully characterized and often cleverly solved intricate problems of color. Consult Nordensvan, *Svensk konst och svenska Konstnärer* (Stockholm, 1892), *Nordiskt Familjelok* (ib., 1903).

BJORNEBORG, byær'ne-bôrg, or **BIORNEBORG** (Finnish *Pori*). A seaport and the capital of a district in the government of Åbo Bjerneborg, Finland, on the east coast of the Gulf of Bothnia, at the mouth of Kumo, 76 miles north-northwest of Åbo, and 156 miles from Helsingfors (Map Russia, B 2). Ship-building is carried on, there is a large export of timber (to England principally) and forest products, and imports consist mostly of rye flour, salt, and iron. Large vessels cannot approach the city and must anchor off Refso. Pop., 1888, 10,100, 1900, 16,666.

BJORNSSON, byær'n'son, BJORNSTJERNE (1832-1910). A Norwegian poet, dramatist, and novelist. He was born at Kvikne, Dec. 8, 1832, the son of a Lutheran pastor. His childhood was passed in Kvikne, Romsdal, and Molde, in noble scenery rich in legendary association. He left the University of Christiania for journalism, having already, as a student, written sketches and reviews of plays, and in 1857 published his first drama, a one-act play, *Between the Battles*, and his first novel *Synnøve Solbakken*, a peasant story, translated by Mary Howitt as *Trust and Trial* (1858). He was made director of the theatre in Bergen and from 1860 to 1863 traveled on a government stipend, in Italy, France, and Germany. Thereafter he resided in Norway, with frequent visits to Paris, Rome, and Munich. In the winter of 1880-81 he lectured in the United States. Bjornsson was the greatest distinctively Norwegian writer, so intensely national that the Danish critic Brandes says that "the mention of his name in a gathering of his countrymen is like running up the national flag." He was the chief novelist, probably the chief poet, and, except possibly Ibsen, the chief dramatist of his country's history. For nearly 30 years he remained leader of the Republican party in Norway and was engaged actively in social and religious controversies. He was an advocate of Norwegian national rights as against

Sweden and as a talented orator and author lent his aid to the movement which brought about the dissolution of the union in 1905. The poet proved himself also a practical politician, and as a natural consequence he changed the character of his literary work, which was at first purely artistic, but in the stress of controversy tended to become didactic. The first period is distinctively lyric and of a romantic-religious character. His plays of this time are sagas, his narrative epics idyllic, and imbedded in them are gems of song, many widely popular and one "national." These were collected in *Poems and Songs* in 1870, and in the same year appeared his only epic, *Armljot Gelline*, founded on an episode in the *Heimskringla*. Thereafter Björnson wrote but little verse. He had already distinguished himself in peasant novels and tales, e.g., *Arne* (1858), *A Happy Boy* (1860), and *The Fisher Maiden* (1868), genuine pastorals, primitive yet modern. The dramas of these years are based on the native sagas, the best of them, *Sigurd Stenbe* and *Sigurd Jorsalfar* (1872), on the *Heimskringla*. *Mary Stuart in Scotland* (1864) is an exception, as is the problem play, *The Newly Wedded Pair* (1866). This realistic-critical style is characteristic of the whole drama of the second period, beginning with *The Editor* (1874) and counting *A Bankruptcy* (1875), *The King* (1877), *Leonarda* (1879), *The New System* (1879), *A Glove* (1883), *Beyond our Strength* (1883), *Geography and Love* (1885), *Paul Lange* and *Tora Persberg* (1898), *Laboremus* (1901), *At Storhove* (1903), and *Dagelcennet* (1904). The novels show the same evolution from *The Bridal March* (1873) through *Magnhild* (1877), *Captain Mansana* (1879), and *Dust* (1882), to the true problem novels *The Heritage of the Kurts* (*Det Flager*) (1884) and *In God's Way* (1889), the former dealing with redemption from heredity through education, the latter with bigotry and liberal thought. This brought on Björnson the imprecations of the orthodox, though its aim was to exalt and purify religion. In 1903 Björnson was awarded the Nobel prize in literature. There are translations of Björnson's novels by Anderson, and of *Sigurd Stenbe* by Payne (Boston). Edwin Björkman's translation of his plays was published in two series (at New York) in 1914. Consult: Brandes, *Moderne Geister* (Frankfort, 1897); Anderson, "Biographical Sketch," in *Symnive Solbakken*, translated by Anderson (Boston, 1882); Gosse, "An Essay on the Writings of Björnson," in *Björnson Novels* (London, 1895); Boyesen, *Essays on Scandinavian Literature* (New York, 1895); Collin, *Björnsterne Björnson*, 2 vols. (Christiania, 1903); Payne, *Björnsterne Björnson* (Chicago, 1910); Bæck, *Soldatene paa Aulestad* (Copenhagen, 1910); Björns-gaard, *Spredte minder fra 50 til 70-aarenes Norge* (Risor, 1911); Björkman, *Voices of Tomorrow* (New York, 1913).

BJÖRNSTJERNA, byörn'shär'nä, MAGNUS FREDRIK, COUNT (1779-1847). A Swedish soldier, statesman, and author. He was born in Dresden, where his father resided as Secretary to the Swedish Legation. He received his education in Germany and joined the Swedish army in 1793. He distinguished himself in the Finnish War and in 1813 was appointed colonel in the army that went to aid the Allies in Germany; took part in the conflicts at Grossbeeren and Dennewitz; was present at Leipzig, and concluded the formalities of capitulation with the

French at Lübeck and Maestricht. Subsequently he fought in Holstein and in Norway, where he signed the treaty which united that country with Sweden. In 1828 he was appointed Ambassador to the court of Great Britain, which office he held till 1846, when he returned to Stockholm, where he died. In addition to some political writings he published *The Theogony, Philosophy, and Cosmogony of the Hindus* (Stockholm, 1843).

BLAAS, bläs, VON. A family of distinguished Austrian painters. The eldest representative, KARL VON BLAAS (1815-94), was born at Nandern (Tyrol) and studied with great distinction at the Academy of Venice. In 1837 he received the Roman prize of the Academy of Vienna. At Rome he came under the influence of the Nazarenes (q.v.) and devoted himself to religious subjects, such as "Jacob's Journey through the Desert" (Museum of Vienna) and the "Visitation" (Innsbruck Museum). His rising fame secured his appointment to a professorship at the Academy of Vienna in 1850. Besides many portraits and religious canvases he painted 33 frescoes for the Altlerchenfeld Church of that city. In 1855 he received a prize at the Paris Exposition for the picture entitled "Charlemagne Visiting a Boys' School" (Venice Museum), and in the same year he accepted a professorship at the Venice Academy, but returned to Vienna in 1866. Among his most celebrated paintings are the following: "Tullia Driving over her Father's Body" (1832); "Rape of Venetian Brides in Sixth Century" (1858; Innsbruck Museum); 42 scenes in fresco (Vienna Arsenal); portraits of Francis Joseph and of the Queen of Spain; "Ekkehard Carrying the Duchess of Suabia across the Threshold of the Monastery."

JULIUS VON BLAAS (1845-), the second son of Karl, has devoted himself principally to equestrian subjects. He was born in Albano, Italy, and after studying with his father went to Rome, where he painted genre scenes from the Campagna. His "Race of Intoxicated Slavonic Peasants" (1869) is in the Imperial Museum of Vienna, which also possesses his "Antlassritt" (1899). Other pictures by him are the following: "Fox Hunt in the Campagna" (1877); "Market in Upper Hungary" (1885); "Horse Fair in Bischofshofen" (1888). He was much employed by the Austrian court as a portrait painter and became professor in the Academy of Vienna. Consult Karl von Blaas, *Autobiographie* (Vienna, 1876).

Karl's eldest son, EUGENE, a genre painter, was born in Albano, Italy, and studied with his father, and afterward at the Academy of Venice and in Rome. He settled in Venice, the life of which, past and present, he depicts in his pictures. The following are among his best works: "Conversion of the Rhätians by St. Valentine," "Cimabue and Giotto," "Scene from the Decameron," "Dogearse Going to Church," "Venetian Balcony," "Scene," "Bridal Procession in San Marco," "Venetian Masquerade," "A Journey to Murano" (Vienna Museum), besides many pictures of Venetian fisher folk. Until 1870 he imitated the Venetian color, but thereafter his tints lost their lustre. He became professor in the Academy of Venice.

BLAAUWBOK. See **BLAUWOK**.

BLACK. In art, black is the name of the darkest color—that which, according to physical scientists, is produced by the absence or by the

complete absorption of the rays of light See COLOR

BLACK, ADAM (1784-1874) A Scottish publisher With his nephew, Charles Black, he established a publishing house in Edinburgh, which began issuing the *Edinburgh Review* in 1826 and obtained the copyrights of the *Encyclopædia Britannica* in 1829 and of the *Waverley Novels* in 1851 Besides managing this immense business, he was Lord Provost of Edinburgh from 1843 to 1848 and was a member of Parliament, as the successor of Macaulay, from 1856 to 1865 Consult Nicolson, *Memoirs of Adam Black* (London, 1885)

BLACK, FRANK SWETT (1853-1913) An American lawyer, orator, and politician, born at Limington, Me He was educated at Dartmouth College and, after some experience in journalism, was admitted to the bar in 1879, practicing law in Troy until 1898 and later in New York City He served as a member of the Fifty-fourth Congress from 1895 until 1897 In the latter year he was inaugurated Governor of the State of New York, and during his two years' term of office showed much ability as an adroit and resourceful party leader On retiring from the governorship in 1899, he resumed the practice of law, but remained an influential member of the Republican party Mr Black was unusually gifted as a political speaker, and in 1904, at the Republican National Convention in Chicago, presented the name of Mr Roosevelt as the nominee of his party

BLACK, HUGH (1868-) A Scotch-American clergyman and author, born at Rotheray He studied at Glasgow University and was ordained to the Presbyterian ministry in 1891 From 1891 to 1896 he was pastor at Paisley and in the latter year was called to St George's Free Church, Edinburgh He became professor of practical theology in Union Theological Seminary (New York) in 1906, and was thereafter regarded as one of the finest preachers in America His publications comprise *Friendship* (1898), *Culture and Restraint* (4th ed., 1901), *The Practice of Self-Culture* (1904), *Edinburgh Sermons* (1906), *Christ's Service of Love* (1907), *University Sermons* (1908), *Comfort* (1910), *Happiness* (1911, 1913), *Three Discourses* (1912), *According to my Gospel* (1913)

BLACK, JEREMIAH SULLIVAN (1810-83) An American jurist and statesman He was born in Somerset Co., Pa., received a common school education, studied law, was admitted to the bar in 1831 and soon acquired a considerable practice He served for some time as deputy attorney-general for Somerset County, and from 1842 to 1851 was president judge of the Sixteenth Judicial District of Pennsylvania He became a judge of the Supreme Court of Pennsylvania in 1851 and filled the office with distinction until 1857, when he became Attorney-General of the United States in President Buchanan's cabinet In this capacity he protected the government against the frauds involved in the famous "California land claims," which grew out of alleged Mexican grants issued before the cession of California to the United States, and on the approach of the Civil War contended vigorously against any interpretation of the Constitution which would justify secession or would prohibit the President from suppressing insurrection or protecting Federal property against the attacks of State forces Black replaced Cass as Secretary of State in December, 1860, and soon after-

ward rendered an important service to the country by inducing Buchanan to take a firm attitude in his negotiations with the South Carolina commissioners with regard to the withdrawal of the United States troops from Fort Sumter At the close of Buchanan's administration, Black served for a time as United States Supreme Court reporter, but resigned to devote himself to his private practice and subsequently took part in many celebrated cases He was counsel for President Johnson in the famous impeachment trial of 1868, but withdrew from the case after the President's answer had been filed In 1877 he was conspicuous as one of Tilden's counsel before the Electoral Commission (qv) and afterward wrote an able argument against the decision of the commission in favor of Hayes Besides winning a foremost place at the bar, Judge Black was known as a thorough classical scholar and a brilliant conversationalist Soon after his death the bar of the Supreme Court of the United States spoke of him as having been "a lawyer profoundly versed in the science of the law and worthy to be ranked with the greatest and ablest of our age and country" His published addresses include *Observations on Territorial Sovereignty* (1860) and *Federal Jurisdiction in the Territories* (1883) Consult C F Black, *Essays and Speeches of Jeremiah S Black, with a Biographical Sketch* (New York, 1885)

BLACK, JOHN (1783-1855) A Scottish journalist He was born near Dunse, where he attended school, and was subsequently articled to a writer He afterward obtained employment as an accountant in Edinburgh, attending classes at the University and doing some literary work He became a reporter for the *London Morning Chronicle* in 1810 and editor in 1817 John Stuart Mill says that Black "played a really important part in the progress of English opinion for a number of years which was not properly recognized," and that he was the "first journalist who carried criticism and the spirit of reform into the details of English institutions" The institutions especially affected by this criticism were the courts and the Church, with the result that the press enjoyed a much larger measure of freedom in dealing with them Black was a friend of James Mill and Lord Palmerston, Melbourne, and Brougham, and was a patron of Charles Dickens, whose connection with the *Chronicle* began in 1835 He published translations of Humboldt's *Political Essay on New Spain* (1811-12), Von Buch's *Travels in Norway and Lapland* (1813), Bezelius' *System of Mineralogy* (1814), Schlegel's *Lectures on Dramatic Literature* (1811), and *Memoirs of Goldoni* (1814)

BLACK, JOSEPH (1728-99) A Scottish chemist He was born in Bordeaux, France, where his father was engaged in the wine trade Both his parents were of Scottish descent, but natives of Belfast, whither their son was sent for his education in 1740 In 1746 he entered the University of Glasgow, in 1751 he went to Edinburgh to complete his medical course, and in 1754 took his doctor's degree His thesis on the nature of the mild and caustic alkaline earths contained his first contribution to chemical science In those days the transformation by heat of a mild alkali (a metallic carbonate) into the corresponding caustic alkali (an oxide, or hydroxide) was interpreted on the hypothesis that the mild alkali combines with the fiery

inciple called phlogiston, and thus the caustic alkali is produced. Black showed, however, that the transformation was accompanied by a loss of weight, and that during the transformation an inferior substance escaped from the mild alkali. It is a ferri-form substance he found to be different from atmospheric air and gave it the name of *de air*. Thus the existence, both in the free state and in combination, of a gas different from—viz., carbonic acid—was first clearly established by Black. Black succeeded Cullen as professor of anatomy (which branch he afterward changed for medicine) and lecturer on chemistry in Glasgow. Between 1759 and 1763 he solved that theory of "latent heat" on which scientific fame chiefly rests, and also showed that different substances have different specific heats, the immediate preliminary to the next great stride in discovery by his pupil and assistant, James Watt. In 1766 Cullen was appointed to the chair of theoretical medicine in Edinburgh, and Black succeeded him in the air of chemistry. Thenceforth he devoted himself chiefly to the elaboration of his lectures, in which he aimed at the utmost degree of perspicuity. He published: *Experiments on Magnesia, Quicklime, and Other Alkaline Substances; Observations on the More ready Freezing of Water that has been Boiled; and Analysis of the Waters of Some Boiling Springs in Iceland*. His *Lectures on the Elements of Chemistry* was published after his death by Robison (2 vols., London, 1803). Cf. Brougham, *Lives of Philosophers of the Age of George III* (London and Glasgow, 1855).

BLACK, WILLIAM (1841-98). A British novelist. He was born in Glasgow, Nov. 9, 41. He studied art for a time in the government school there, with the intention of becoming an architect; but he soon abandoned art for journalism. After some experience on the *Glasgow Weekly Citizen*, he went to London, where first he wrote for the magazines. In 1865 he joined the staff of the *Morning Star*, becoming the next year its special war correspondent during the Prusso-Austrian War. Subsequently he was for a short period assistant editor of the *Daily News*. He died Dec. 10, 1898. He produced more than 30 novels, among which are: *Daughter of Heth* (1871), which gained him a reputation; *Kulmeny* (1870); *Strange Adventures of a Phaeton* (1872); *A Princess of Thule* (1873); *Madcap Violet* (1876); *Macleod of Dare* (1878); *Three Featherers* (1881); *Shandon Bells* (1883); *Judith Shakespeare* (1884). In *Far Chamber* (1888); and *Wild Eelin* (1898). As they are observed from these titles, Black laid his scenes mostly in northern Scotland, which he knew and loved well. It was, however, his pungent practice to contrast the simple manners of his country folk with the London Bohemia. His novels, some of which were extremely popular, show more than average workmanship. Some of them quite reach the high art of the best novelists, though *A Daughter of Heth* reveals talent which almost approaches genius. Cf. Sir Wemyss Reid, *William Black, Novelist: A Biography* (New York, 1902).

BLACK, WILLIAM MURRAY (1855-). An American army officer, born at Lancaster, Pa.; graduated from Franklin and Marshall College and later from West Point, engaged largely in government river and harbor improvement work, and passed through the grades of the Engineer Corps of the army to that of lieutenant

colonel and chief engineer of the United States Volunteers in 1898. He taught at West Point before the Spanish-American War and after it served at Havana, in the Philippines, and at the Panama Canal. In 1909 he was appointed chief engineer of the Eastern Division of the United States, and upon the retirement of Gen. William H. Bixby (q.v.) in 1913 he was advanced to chief of the Engineer Corps.

BLACK ACTS. Scottish parliamentary acts dating from 1424 to 1594; so called because they were all printed in the black, or Saxon, characters. The expression "Black Act" is also applied to an act of George I (1722), directed against poachers who, with their faces blackened or otherwise disguised, and associated, as we are told in the preamble of the act, under the name of Blacks, appeared in Epping Forest, near Waltham, in Essex, destroyed the deer there, and committed other enormities. This act, made perpetual in 1758, was subsequently repealed, together with numerous other statutes, in 1827 by 7 & 8 George IV, c. 27.

BLACK APPLE. A name applied in Queensland and New South Wales to *Sideroxylon australe*, formerly called *Achras australis*, a tree of the family Sapotaceae. The tree produces an edible fruit about the size of a plum. The timber of this and several other Australian species is close-grained, hard, and easily worked, and is valuable for cabinetwork and especially for carving.

BLACK ASSIZE. A popular name commemorative of an extraordinary epidemic of jail fever which broke out at Oxford at the close of the assizes, July 6, 1577. Contemporary accounts describe it as having originated in the courthouse immediately after a sentence to lose his ears was passed on Richard Jencks, a bookbinder accused of sedition. It was popularly interpreted as a divine judgment on the cruelty of the sentence; but the phenomenon is satisfactorily explained by the pestilential atmosphere of the adjoining jail, then, and long afterward, a seat of misery, filth, and disease. From the 6th of July to the 12th of August, 510 persons are said to have died in Oxford and the neighborhood of this terrible malady, among whom were the chief officials who sat at the assize, most of the jury, and many members of the university. Women, poor people, physicians, visitors, and children are said to have escaped the infection. A similar event is recorded as having taken place at Cambridge at the Lent Assizes in 1521. Consult: Holinshed, *Chronicles* (London, 1577; reprint, 6 vols., London, 1807-08); Stow, *Annales* (1st ed., London, 1580, ed. Howe, London, 1831); Wood, *Athenæ Oxonienses* (1st ed., London, 1691-92; 4th ed., ed. Bliss, Oxford, 1848).

BLACKBAND IRONSTONE. An ore of iron, found commonly in rocks of the Carboniferous system and to a lesser extent in the Jura-Trias system, of several countries. It occurs in bands or rounded masses and is often associated with coal and sometimes with limestone. It is mainly a carbonate of iron, accompanied by some coaly matter and clay impurities. In the United States blackband ores are obtained in Pennsylvania, Ohio, and Kentucky. In Europe Scotland yields some. This ore is low in iron, as shown by the percentage composition of an Ohio ore from Tuscarawas: silica, 26.22; phosphorus, 0.27; iron carbonate, 54.69; iron sesquioxide, 10.42; alumina, 0.70; manganese,

170, lime carbonate, 2 00, sulphur, 1 84 Before melting in the blast furnace, blackband ironstone has to be roasted. It is seldom used alone, and the United States' production is very small. See IRON, *Iron Ores*.

BLACK BASS, BLACK DUCK, etc. See the substantives.

BLACK BEETLE A common name in England for the Oriental cockroach (see COCK-ROACH), also, rarely, for beetles of the genus *Blaps*.

BLACK BERRY A term applied to various species of *Rubus* which bear a fruit consisting of an aggregation of small drupes or berries, arranged about the receptacle to which they adhere, and which, when ripe, separates from the plant with the drupes and forms a part of the so-called fruit. In America the blackberry and dewberry, or running blackberry (*Rubus canadensis*), are indiscriminately spoken of as blackberries, while the English bramble (*Rubus fruticosus*) is also called a blackberry. In America these fruits, with the exception of *Rubus fruticosus*, have attained a commercial status, and each year widens their range of cultivation. Although existing in a high state of development as wild plants, they attracted little attention as garden fruits until as late as 1850. Now, however, they are extensively cultivated over a wide area.

The blackberry is propagated almost exclusively from root sprouts, suckers, and root cuttings. New varieties are secured by planting the seed, but most of the named varieties now on the market are chance seedlings from wild or cultivated plants. The habit of growth of the blackberry renders it necessary to set the plants not closer than 3 by 8 feet for the smaller growing sorts, while 4 by 10 is not too wide for the larger kinds. The fruit is extensively used for canning, both in a commercial and domestic way, but it finds its chief market as a fresh fruit for dessert purposes. The bark of the root has tonic properties which are much prized by the country folk. A fluid extract made from blackberry root is sometimes prescribed in cases of diarrhoea. For illustration and a discussion of the genus, see RUBUS, also see DEWBERRY.

BLACKBERRY DISEASES See RASPBERRY DISEASES.

BLACK BESS The name of the English highwayman Turpin's mare.

BLACK BIRD Any of several different birds prevaillingly black in plumage, in America, a member of the family Icteridæ. About a

generally the contrast is very great. In most of the species the female is not black at all, and the young resemble her. The largest of the American blackbirds are those known as crow-blackbirds—*or*, more properly, grackles (*q v*)—one species of which reaches a length of 18 inches, but is not so heavy as a crow. The other blackbirds are much smaller—less than a foot in length—and are distinguished from each other chiefly by color. In the eastern United States we have only the cowbird (*q v*) and the red-winged blackbird (*Agelaius phœniceus*), the male of the former uniform lustrous black, with a brown head and the latter jet-black, with a scarlet patch on each "shoulder" (See RED-WING). In the Middle West, besides the eastern species, there occurs the handsome yellow-headed blackbird (*Xanthocephalus xanthocephalus*), in which the whole head and throat is yellow, or even orange. The Pacific coast has also the red-and-white-shouldered blackbird (*Agelaius tricolor*), which is bluish black, with a dark blood-red patch on the wing, bordered with pure white. All of these species, except the cowbirds, frequent marshy grounds or swamps to breed and often gather in large flocks, the more especially during the migrations. They feed on almost everything in the insect or vegetable line, but though they sometimes damage corn fields, they are beyond question beneficial. The nests are built on or near the ground in the swamps, among reeds or small bushes, and are composed chiefly of dried grass and reeds. The eggs are pale blue or grayish green, scrawled or spotted with brown.

In the Western States the lark bunting (*Calamospiza melanocorys*) is sometimes called the white-winged blackbird, while in the East the bobolink is frequently called the skunk blackbird, on account of its peculiar markings, and in Florida and the West Indies the ani is commonly termed savanna blackbird.

In Europe, the name "blackbird" is given to an entirely different bird, the merle, a thrush (*Turdus*, or *Merula merula*). It occurs throughout Europe, except Spain, where, as well as in northwest Africa and Asia, it is replaced by closely related forms. The male is deep black, while the female and young are rusty brown. Like the other thrushes, the merle is chiefly insectivorous, though it often eats fruit, and is a fine singer, although the notes are somewhat too loud to make it an acceptable cage bird. See PLATES OF BLACKBIRDS and of EGGS OF SONG BIRDS.

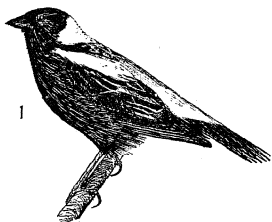
BLACK BOOK The designation of various historical and other works, so called from the character of their type or their binding or contents. Among the more popularly known are a university register, in which students' misdemeanors are recorded, any volume treating of necromancy or the "black art", and, in Great Britain, the list of habitual criminals published since 1877. The most important historical black books are the volume formerly attributed to Gervase of Tilbury, but now known to be the compilation of Nigel, Bishop of Ely (died 1169), giving a detailed description of the Court of Exchequer, its officers, their duties and privileges, etc., also of the revenues of the crown, a book of admiralty statutes and ordinances of the reign of Edward III, first edited by Sir Travers Twiss (4 vols, London, 1871-78), and a series of reports compiled by order of the visitors to the English monasteries in the reign of Henry



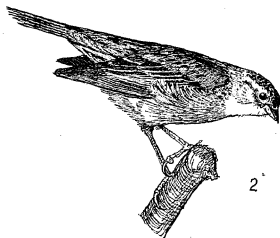
HEAD AND FOOT OF A TYPICAL BLACKBIRD

dozen species dwell in the United States. They agree in the possession of a rather long and slender beak, with cutting edges, and have only nine primaries in the wing, but are distinguished from each other by size and color. The males, when in full plumage, are always somewhat more strikingly colored than the females, and

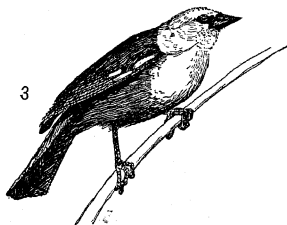
BLACKBIRDS



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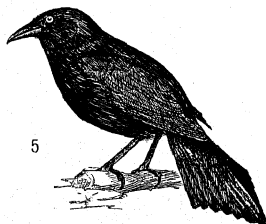
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1. BOBOLINK (*Dolichonyx oryzivorus*); male in summer plumage.
2. BOBOLINK; female.
3. YELLOW-HEADED BLACKBIRD (*Xanthocephalus xanthocephalus*).

4. COW-BIRD (*Molothrus ater*).
5. PURPLE GRAKLE (*Quiscalus quiscula*).
6. RED-WINGED BLACKBIRD (*Agelaius phoeniceus*).

VIII. Their presentation to Parham in 1536 was followed by the suppression of those institutions. These reports probably never formed a bound volume, although one is fabled to have been burned by order of Queen Mary. The reports still in existence are considered by recent historians to be extravagant and malicious in their statements. Consult Gardner, editor, *Letters and Papers of the Reign of Henry VIII* (London, 1880-86).

BLACK/BREAST. Either of two American bay birds. 1. The black-bellied plover (*Squatarola*, or *Charadrius squatarola*). 2. The dunlin (*Tringa*, or *Pelidna, alpina*); also called blackheart.

BLACK BRUNS/WICKERS, or THE DEATH'S-HEAD CORPS. A troop of 2000 hussars, organized in Germany by Frederick William, Duke of Brunswick, in May, 1800, during the Napoleonic wars. Their uniform was jet black and ornamented with lace in imitation of the ribs of a skeleton. Their helmets were adorned with silver skulls and crossbones and with black horsehair tresses instead of plumes.

BLACKBUCK (so named from its blackish brown color; AS. *bucca*, he-goat, *buc*, a male deer, OHG. *boch*, Ger. *Bock*, he-goat). The common antelope of India (*Antelope cervicapra*), which ranges over the whole of the peninsula and Assam, wherever there are open plains. A male blackbuck stands about 32 inches high at the shoulders and will weigh, alive, about 85 pounds. The horns usually run from 16 to 20 inches in length, but may reach 28 inches. They arise close together and are cylindrical and ringed, with an elegant spiral twist of from three to four turns. The does are hornless, as a rule.

Old males are among the handsomest of all antelopes, the contrast of the full blackish brown of the greater part of the head, body, and outer sides of the limbs with the white of the under parts and the ring around the eye being most striking. Young bucks, and the does of all ages, are rich yellowish brown, a color which renders them less conspicuous to their enemies. These pretty little antelopes are always found either in open ground, wild, grassy plains, or cultivated tracts, and go in herds, sometimes reaching hundreds, or even thousands, in number. Ordinarily, however, bands containing only from 10 to 40 individuals are met with, led by one shining, black-coated old buck. See PLATE of GAZELLES.

Sport.—They are a favorite object of sport, but in many parts of India are so protected by the prejudice of the natives as to suffer little from the gun. The literature of sport with the gun in India abounds in descriptions of blackbuck hunting. The usual method is to chase them with greyhounds. Where the plains are very sandy, this coursing is usually successful, and it affords the sportsmen who follow the dogs on horseback the exhilaration of a fine burst of speed before seeing the prey pulled down; but elsewhere, on open, hard deserts, or where plains of tough turf give the fleet little animals a good foothold and fair start, it is rare that the best of dogs can catch them. They are also chased with the cheeta and with falcons. The name is sometimes applied to the African sable antelope.

BLACK BUL/LY, BALLY-TREE WOOD, or SAPODILLA PLUM (*Achras sapota*). A tree peculiar to South America and the West Indies, having a durable wood that is used for shipbuilding, and a milky juice which is thickened

by evaporation and exported as gutta-percha. The tree is extensively cultivated throughout the tropics on account of its excellent fruit. The bark is febrifugal, and the seeds have diuretic and aperient properties.

BLACKBURN (named after the river Blackburn, from AS. *burna*, brook, stream, Ger. *Brunnen*, well, Eng. *burn*, rivulet, brook). A manufacturing town in Lancashire, England, on the Blackburn (generally called "the Brook"), and the Leeds and Liverpool Canal, 24 miles north-northwest of Manchester (Map England, D 3). Among its notable public buildings are a handsome townhall, a fine Gothic exchange, and a newly erected Drapers' Hall. There are two large parks—Corporation Park and Queen's Park, opened in 1887. Blackburn was incorporated in 1851 and since that date has rapidly advanced to the front rank of flourishing manufacturing towns. It has owned its water supply since 1875. The acquisition of the gas works followed in 1877, and in 1895 the corporation began the supplying of electricity. The street railways and suburban lines were taken over in 1898. The town also maintains public baths, markets, slaughterhouses, and cemeteries. Among its educational institutions are a grammar school, founded by Queen Elizabeth in 1567 (modern buildings, 1884); a technical school, maintained by the corporation; a public library, with which is connected a museum; and an art gallery. The town also maintains two hospitals. It has a modern and profitable sewage system, including extensive irrigation works, precipitation plant, and two farms. The great business of the town is the weaving of cotton stuffs. There are also large establishments for the manufacture of weaving machinery, and considerable manufacture of iron. Blackburn is the birthplace of John Morley (q.v.), and here James Hargreaves (q.v.), a native of the town, invented the spinning jenny about 1764. He was driven out of the town by a mob of workmen who feared that machinery would deprive them of their livelihood. Pop., 1891, 120,064; 1901, 127,527; 1911, 133,064.

BLACKBURN, JOSEPH CLAY STYLES (1838-). An American legislator, born in Woodford Co., Ky. He graduated from Centre College in 1857, entered on the practice of law in Chicago, and served in the Confederate army throughout the Civil War. For several years he was a member of the Kentucky House of Representatives and during the decade 1875-85 was in Congress. From then until 1897, and again in 1901-07, he was United States Senator from Kentucky. At the end of his second term he was appointed a member of the Isthmian Canal Commission and head of the department of civil administration of the Canal Zone. This office he resigned in 1909. One of the best-known Democratic campaigners and politicians of his day, Senator Blackburn was delegate to the Democratic National conventions in 1896, 1900, and 1904, and was chairman of the Democratic caucus in the Senate in 1906-07. He was noted as an orator of the florid type.

BLACKBURN, WILLIAM MAXWELL (1828-1898). An American clergyman and author. He was born in Carlisle, Ind., graduated in 1850 at Hanover College, and in 1854 at Princeton Theological Seminary, and held pastorates in Erie, Pa., and Trenton, N. J. In 1898 he was appointed professor of biblical and ecclesiastical history in the Presbyterian Theological Semi-

nary in Chicago, Ill. He was appointed president of the Territorial University of North Dakota in 1884 and in 1886 of Pierre University (now Huron College). He contributed to the *Princeton Review* and other periodicals, and published *Exiles of Madeira* (1862), *The Rebel Prince* (1864), *The College Days of Calvin* (1866), *Ulrich Zwingli, the Patriotic Reformer* (1868), *The Theban Legion* (1871), *History of the Christian Church from its Origin to the Present Time* (1879), *Historical Sketch of North and South Dakota* (1893).

BLACKBURNE, FRANCIS (1782-1867). An Irish Lord Chancellor. He was born at Great Footstown, county Meath, Nov. 11, 1782. He entered Trinity College, Dublin, in 1798. He studied law in Dublin and London and was admitted to the English bar in 1805 and to the Irish bar in 1822. In 1830 he was Attorney-General for Ireland under Earl Grey's government. When a renewal of the Insurrection Act was necessitated by the disturbed state of Ireland, Blackburne devoted himself to the vigorous application of that measure in Limerick and at the end of two years succeeded in restoring order. His activity against the riotous opponents of the collection of tithes, and a legal victory gained over O'Connell, antagonized that politician and his followers, and their bitter attacks led to his resignation. For a period of seven years following this incident he was consistently overlooked as place after place became vacant on the bench. Finally, in 1841, Sir Robert Peel again appointed him Attorney-General for Ireland. In the critical period of 1847-48 he presided with conspicuous ability in the prosecution of Smith O'Brien and others who were convicted of treason. In 1852 he was made Lord Chancellor, but resigned soon afterward. In the same year he was appointed a commissioner of education and in 1856 became Lord Justice of Appeals. He accepted the office of Chancellor for the second time in 1866, but his appointment being loudly condemned, he was induced to resign. He was for some years vice chancellor of Dublin University, and in 1867 declined Lord Derby's offer of a baronetcy. See O'CONNELL, DANIEL, and consult E. Blackburne, *Life of Lord Chancellor Francis Blackburne* (London, 1874).

BLACKBURNE, JOSEPH HENRY (1842-) An English chess player, born in Manchester. In his youth he became an expert at draughts (checkers), from which he soon turned to chess. Inspired by the performances of Paul Charles Morphy (qv), he became highly proficient in "blindfold" play, at which, in 1862, he defeated ten other players simultaneously, without seeing any of the boards. He began regular tournament play in 1868 and during the next 30 years competed in practically all of the important matches with remarkable success. Probably his greatest achievement was in 1881 at Berlin, where, after losing his first game, he played 15 more, of which he won 13, and drew two, defeating Zukertort, and taking the first prize. Consult MacDonnell, *Chess Life-Pictures* (London, 1883), and Chesshire, *The Hastings Chess Tournament* (New York, 1896).

BLACK'CAP A name in England and America of various small birds which have the top of the head black. In America it is properly applied to one of the fly-catching warblers, also called Wilson's warbler (*Sylvania*, or *Vilsonia pusilla*), a small olive and yellow bird, the male

of which has the top of the head rich, lustrous black. It frequents swamps and low woodlands, where it is very active in search of its insect prey and builds its nest near the ground. The black capped titmouse, or chickadee (*Parus atricapillus*), also frequently receives this name in the United States. See **TITMOUSE**.

In Europe the name is given to one of the warblers (*Sylvia*, or *Curruca*, *atricapilla*), closely allied to the nightingale, and one of the sweetest song birds of Great Britain. It is smaller than the nightingale and plain gray and ashy-brown. The male has the top of the head jet black, but in the female it is a dull rust color. This blackcap is very popular as a cage bird.

BLACK CAP See **RUBUS**.

BLACK CAP In England, the ceremonial head covering assumed by the judges of the higher courts on solemn occasions, as when pronouncing sentence of death, attending divine service in state, or at the official reception by the judges of the Lord Mayor of London. It is a square, limp cap of black cloth and is, like the academic "mortar board," a survival of the "pointed cap" worn by the judges and ecclesiastical dignitaries in the Tudor period. It was originally worn as a sign of judicial superiority. On certain ceremonial occasions it is replaced by a black cocked hat. It is not to be confounded with the *coif* (qv), which was the distinctive badge of the order of sergeants at law (qv).

BLACK'CAT A Canadian fur bearer. See **FISHER**.

BLACK CHALK A variety of clay containing a large amount of carbon. It is found in Carnarvonshire, Wales, and on the island of Islay off the coast of Scotland. It is used for drawing and, when ground, as a black pigment.

BLACK'COCK (fem *Gryehen*) A dark-colored grouse (*Lagopus*, or *Tetrao tetras*), with outward curling tail feathers, prevalent on moorlands throughout Europe. It is known in Great Britain as black grouse, or black game, and as heath cock and heath hen, while the young are called poult. See **GROUSE** and **PLATE OF GROUSE**.

BLACK CODE See **BLACK LAW**.

BLACK CO'HOSH See **CIMICIFUGA**.

BLACK DEATH (Lat. *pestis*, *pestis bubonica*, *pestis inguinalis*, bubonic plague) One of the names given to an Oriental plague. An acute infectious disease caused by the presence of a specific microbe (*Bacillus pestis*), and marked by suppuration and tumors, which in the fourteenth century desolated the world. It took this name from the black spots caused by subcutaneous hemorrhages which, in severe cases, appeared in the skin. The symptoms were swelling of glands and formation of buboes, headache, vertigo with tottering gait, pains, deafness, convulsions, cough, and expectoration of bloody mucus in some cases, enlargement of liver and spleen, etc. On the first appearance of the plague in Europe, fever, the evacuation of blood, and affection of the lungs brought death before the other symptoms could be developed, afterward boils and buboes characterized its fatal course in Europe, as in the East. In almost all cases its victims perished in two or three days after being attacked. Rufus of Ephesus wrote of its appearance in Libya, Egypt, and Syria during the third century B.C. The plague which broke out in the reign of Justinian originated in Egypt about 542 and passed

through Constantinople, Gaul, Spain, Marseilles, and thence over all Europe, lasting 50 years and resulting in enormous mortality. The precise date of the appearance of the plague in China is unknown, but from 1333 till 1348 that great country suffered a terrible mortality from droughts, famines, floods, earthquakes which swallowed mountains, and swarms of innumerable locusts, and, in the last few years of that period, from the plague. The pestilence had, in a milder form, appeared in Europe in 1342. The invasion of 1348 may be tracked from China in its advance by the various caravan routes toward the west. The northern coast of the Black Sea sent the plague by contagion to Constantinople. Thence it spread to the seaports of Italy and soon established itself over Europe. Its advance may be traced through Germany and France to England, from which it was transmitted to Sweden. It was three years from its appearance at Constantinople before it crept, by a great circle, to the Russian territories.

There are no proper materials for estimating the mortality which this plague produced, for it occurred before the value of statistics was appreciated. But in China 13,000,000 are said to have died and in the rest of the East nearly 24,000,000. Coming to Europe, the horror is increased by the greater exactness of the details. London alone lost over 100,000 souls; 15 European cities lost among them about 300,000; Germany is calculated to have lost 1,244,000; Italy, one-half its population. On a moderate calculation it may be assumed that in Europe 25,000,000 human beings perished. Africa suffered with the rest of the known world. All animal life was threatened. Rivers were consecrated to receive corpses, for which none dared to perform the rites of burial, and which in other places were cast in thousands into huge pits made for their reception. Death was on the sea, too, as well as on the land, and the imagination is quickened to the realization of the terrible mortality by accounts of ships without crews—the crews dead and putrefying on the decks of the aimless hulks—drifting through the Mediterranean, the Black, and the North seas, and cursing with contagion the shores on which winds or the tide chanced to cast them.

Many died of fear, which among the living disolved the ties of kindred; mothers forsook their plague-stricken children; the worldly became quickened to a maddening sense of sin; the religious fixed their eyes more steadily on futurity; all rushed to sacrifice their means to the Church, while the ecclesiastics drew back from the gold showered over their walls, as being tainted with death. In other cases people abandoned themselves to crime and debauchery. Superstition finally banded multitudes together by common means to work out the common safety. In Hungary, and afterward in Germany, rose the brotherhood of the Flagellants (q.v.), who undertook to expiate the sins of the people and avert the pestilence by self-imposed sufferings. Originally of the lower classes, they gathered to their order, as it extended, crowds of the highest, both men and women, and marched from city to city, robed in sombre garments, with red crosses on the breast, back, and cap, and with their heads covered as far as the eyes; they went chanting in solemn processions with banners, with downturned faces, and bearing triple scourges with points of iron, with which at

stated times they lacerated their bodies. They at last pervaded nearly all Europe; Germany, Hungary, Poland, Bohemia, Silesia, and Flanders did them homage. The order was not suppressed till the Pope, at the instigation of several crowned heads, prohibited throughout Christendom their pilgrimages on pain of excommunication. While the wanderings of the Flagellants threw society into confusion and helped to spread the plague, the horrors of the time were further heightened by the fearful persecutions to which the Jews were subjected, from a popular belief that the pestilence was owing to their poisoning the public wells. The people rose to exterminate the Hebrew race, of whom in Mainz alone 12,000 were cruelly murdered. They were killed by fire and by torture wherever they could be found, and to the terrors of the plague for them were added those of a populace everywhere infuriated against them. In some places the Jewish people immolated themselves in masses; in others, not a soul of them survived the assaults of their enemies. No adequate notion can be conveyed of these horrors. To aggravate the pestilence, the poison panic made the people shut up their wells. With terror of poison and of plague in a state of society rude at the best, but now disorganized, what means were available to mitigate or prevent the sufferings of the people were rendered altogether nugatory. The enormous decrease in the population of Europe occasioned by the Black Death necessarily brought about great and lasting changes in social conditions. Perhaps on no class of society were the effects of the plague so marked as on the laboring population, among whom the rate of mortality had been especially great. Immediately after the cessation of the pestilence, what would be called at present a very serious stringency in the labor market ensued. In England, where probably one-half of the population had been swept away (according to some chroniclers the survivors numbered only one-tenth), the agricultural laborers banded together for the purpose of securing higher wages. This led to a struggle between the laborers and the landlords, which took the form of violence on one side, and on the other of legislation fixing the scale of wages and prohibiting the migration of laborers from place to place, culminating in the peasant revolt of 1381 (see TYLER, WAT), and resulting in the gradual abolition of villenage and the reorganization of land-holding relations on the basis of rent, as between owner and tenant, and wages, as between farmer and laborer.

Bibliography. The following authors refer to or describe the Great Plague: Chaucer; Langland; Boccaccio in the *Decameron*; Bulwer, in *Rienzi* (Boston, 1890); Hecker, *Epidemics of the Middle Ages* (London, 1849); Creighton, *History of Epidemics in Britain* (New York, 1892); Hecker, *The Black Death* (London, 1890); F. A. Gasquet, *The Great Pestilence* (London, 1894); De Foe, *Journal of the Plague Year*. See PLAGUE.

BLACK DOSE, or DRAUGHT. See SENNA.
BLACK DROP, or BLACK LIGAMENT. An optical illusion noticed during the transit of Venus or Mercury across the sun's disc. At the first internal contact, when the disc of the planet separates from the edge of the sun, the former appears to become elongated toward the latter, remaining for some time connected with it by a narrow neck called the "black drop."

This breaks suddenly at last, but not until the planet has progressed to some distance from the sun's edge. The same phenomenon is observed as the planet is nearing egress. It has been variously ascribed to instrumental imperfections, atmospheric agitation, and irradiation (q.v.). With suitable precautions, however, its effect in preventing the accurate determination of the times of ingress and egress of the planet can be considerably diminished.

BLACK DUCK, BEAR, SQUIREEL, TERN, etc. See the substantives.

BLACK DWARF, THE. The title of a novel by Scott (1816). Its scene is laid in the time of Anne, and it is founded on a Scottish legend.

BLACK EAGLE. See **EAGLE**, **BLACK**.

BLACK EAGLE, ORDER OF THE. See **ORDERS**.

BLACK-EYED SUSAN, or **ALL IN THE DOWNS**. The name of a popular comedy of 1829, by Douglas Jerrold founded on Gay's ballad.

BLACKFIN, or **BLUEFIN**. A large whitefish (*Agyrosomus nigripinnus*) of the deep waters of Lake Michigan and certain lakes in New York State, distinguished by its blue-black lower fins. See **Plate of WHITEFISH**, etc.

BLACKFISH. Any one of a variety of dark-colored fishes. In the United States the name refers mostly to the tautog (see **TAUTOG** and **Colored Plate** accompanying the article **FISH AS FOOD**). Others are a sea bass (*Centropomus striatus*) of the east coast, and a minnow (*Orthodon macrolepidotus*) of the Pacific coast.

In Alaska the local "blackfish" is a small fresh-water fish (*Dallia pectoralis*), set apart as the sole representative of the family **DALLIIDÆ** and the order **XENOMI**, which is only 8 inches long. It inhabits the streams and ponds of northern Alaska and Siberia and exists in countless numbers in all the ponds and shallow waters, forming the chief food of the natives. "The species feeds on plants and worms. Its vitality is extraordinary. Blackfishes will remain frozen in baskets for weeks, and when thawed out are as lively as ever." Indeed Turner tells of a frozen individual swallowed by a dog which escaped in safety after being thawed out by the heat of the dog's stomach. Its body is oblong, color nearly black, and its structure implies an ancient type. See **Plate of KILLIFISHES**, etc.

In England the name is given to one of the ruffs, a scumbroid (*Centrolophus niger*), about 2 feet long, having somewhat the shape of a perch, with a single long, rather low dorsal fin. It is good to eat and occurs rather abundantly in the deeper waters off the south coast of Europe.

BLACKFISH. A black killer whale of the genus *Globicephalus*. Several species inhabit northern seas. One of these is the bottle head, caving, or pilot whale (*Globicephalus melas*) of British waters. The common blackfish of the Atlantic is *Globicephalus brachypterus*, and that of the north Pacific *Globicephalus scammonii*. They roam about in herds, like grampuses, and often enter harbors in pursuit of fishes. They are killed for the sake of a small yield of oil resembling sperm oil, but inferior, the flesh is edible. (See **KILLER** and **CAVING WHALE**.) The name is also given by sailors to various other small cetaceans. Consult Bullen, *Voyage of the Cachalot* (New York, 1898); Scammon, *Marine Mammals of Northwestern North America* (San Francisco, 1874); Goode, *Fishery Industries*, sec. 1 (Washington, 1884); True, "Re-

view of the Delphinidae, in *Bulletin U S Nat Mus*, No. 36 (Washington, 1889).

BLACK FLUX (Lat. *fluxus*, a flowing, flow, from *fluere*, to flow). A mixture of potassium carbonate and charcoal, used as a reducing agent in assaying. It is prepared by mixing one part of potassium nitrate (nitre) with from two to three parts of potassium bitartrate (cream of tartar) and deflagrating by stirring with a red-hot iron until action ceases. The product is powdered and kept in a closely covered jar in order to prevent it from absorbing moisture from the atmosphere. An excellent substitute for ordinary black flux may be obtained by mixing 3 parts of flour with 10 parts of sodium bicarbonate.

BLACK FLY. A gnat of the forest regions of north temperate latitudes, especially tormenting to man and beast, and representing the family Simuliidae. All the insects of this family are short, small, and thick-bodied, having no simple eyes and no transverse suture in the thorax, they rarely exceed one-fourth of an inch in length. The larvae of these flies are aquatic, unlike mosquitoes, living in swift-running streams. Their eggs are deposited in closely packed layers on rocks near or below the surface of the water, into which the larvae drop when freed from the egg and become attached to plants, stones, etc., by a silken thread, or sometimes to each other, forming long floating strings, they soon pupate within silken cocoons, open at the ends so as to admit water. There may be several broods, the last producing young that hibernates in the larval stage. Hence the first emergence of imagoes (flies) is early in the spring. As summer advances, the insects become excessively numerous in such favorable regions for them as the well-watered forests of northern New York, Maine, and Canada, where in hot weather they abound in such swarms as to put a stop to work in the woods, and even to cause the death of poultry and other animals which cannot escape them. In Labrador life is practically impossible away from the seashore while the flies are in force. They suck blood like mosquitoes, but, unlike them, are worse in sunshine, becoming dormant on cloudy days. Thirteen species are known, that of the St. Lawrence valley (*Simulium venustum*) being different from that of Lake Superior. To protect themselves, people build smudges and smear their faces and hands with ointments, of which the best is oil of tar, habitually used by the employees of the Hudson's Bay Company. Consult, for a monograph of the group *Bulletin No. 10, Ent. Division, U S Dept. Agric.* (Washington, 1898). See **BUFFALO GNAT**.

BLACKFOOT. An Algonquian tribe of the plains, formerly roaming over the country about the head of the Missouri, from the Yellowstone northward to the North Saskatchewan and westward to the Rocky Mountains. They are now confined to reservations in Montana and the adjoining territory of British America. The name "Blackfoot" is said to have been given to them from the fact that when they first appeared in the upper Missouri country their leggings were black, as a result of their traveling over the recently burned prairie. They are divided into three great subtribes: the Siksika or Blackfoot proper, Kama or Blood, and Pikuni or Piegan, each in turn being subdivided into bands. The most striking cultural trait is the complexity and number of their ritualistic ceremonies. Associated with them were the

weaker tribes, Gros Ventres, and Sarsi (q.v.). Less than a century ago they were one of the strongest and most warlike tribes of the plains, being estimated as high even as 40,000 souls. They still number over 5000, of whom about 2100 are on the Blackfoot Reserve in Montana, the others being in British America. Grinnell (*Blackfoot Lodge Tales*, 1903) has made an interesting study of their mythology. An exhaustive discussion of their culture has been published by Wissler, *Anthropological Papers, American Museum of Natural History*, vols. ii, 7, vii, and xi. Consult also, McClintock, *Old North Trail* (New York, 1910), and Grinnell, *Blackfeet Indian Stories* (New York, 1913).

BLACK FOREST (Ger. *Schwarzwald*; so called from the dark foliage of its fir and pine trees). A wooded mountain region in the southwestern part of Germany, occupying about two-thirds of the southern part of Baden and one-third of the western part of Württemberg (Map: Germany, C 4). Extending about 100 miles south from Durlach and Pforzheim, its natural boundaries on the east are formed by the Nagold and the Neckar, and on the south and west by the Rhine. Its width varies from about 38 miles in the south to about 14 miles in the north, while its entire area is estimated at about 1900 square miles. The west slope of the region falls off abruptly toward the valley of the Rhine, in contrast to the east slope, whose incline is very gradual. The southern, or upper section, which is the widest part of the region, contains its greatest elevations. Among them are the Feldberg, 4800 feet, the highest peak of the entire region, sending off numerous offshoots, ranging in altitude from 3900 to 1200 feet; the Herzogenhorn, 4610 feet, the Belcher, 4600 feet, and a number of inferior elevations. Near Altbreisach, in the district of Freiburg, is situated the isolated volcanic mass of the Kaiserstuhl. The northern or lower part of the region is inferior in elevation to the southern and is less mountainous in general appearance. Its highest peak is the Hornisgrinde, 3790 feet, and there are a number of other elevations of a little over 3000 feet. The Black Forest, known for its great water supply, gives rise to a number of rivers, including the Danube and Neckar, and contains numerous lakes on its east slope. Geologically the region is composed of Archean granites and gneiss, which form its core, porphyry is found mostly on the sides; and sandstone occurs in the more elevated parts and at the base. The mineral resources of the region are of little importance, and its deposits of silver, cobalt, and copper are practically exhausted, though there are some workable coal seams near Offenburg. Mineral springs, however, are abundant and include such well-known health resorts as Baden-Baden and Wildbad. The climate is on the whole healthful, although somewhat raw in the more elevated parts. In the plains agriculture and cattle raising are pursued with more or less success, and here are some vineyards on the western slope. Up to a height of about 2000 feet there is a luxuriant growth of oaks and beeches, above which, to about 4000 feet, is a thick black belt of firs, which gives the region its name. The chief occupation of the inhabitants is the production of wooden clocks, musical instruments, and other manufactures of wood as well as watches. The Black Forest, which is much frequented, abounds in well-kept roads, and passes, among which the

Hollenthal Pass, near Neustadt, is the best known and is crossed by a number of railway lines. Two of the passes, the Knebis and the Holle, acquired considerable celebrity during the wars of the French Revolution. The first, situated on the borders between Baden and Württemberg, at the source of the Murg, was taken by the French in 1796 and in 1797; the Holle is known in connection with Moreau's retreat in 1796.

The Black Forest has been made the scene of many weird and curious stories, and it is associated with a vast number of legends, folk tales, and popular superstitions.

BLACK FRIARS. See DOMINICANS.

BLACK-FRIARS THEATRE. The first regular playhouse in the district of Blackfriars, London. It was erected in 1596 by James Burbage, who got its site and part of its structure as a gift from Sir Thomas Cawarden's executor. Shakespeare played here in 1598 in Ben Jonson's *Every Man in his Humour*. Burbage's company, which occupied the place, was known first as the Lord Chamberlain's Company and then as the King's Servants. The theatre was torn down in 1655.

BLACK FRIDAY. The name applied to two disastrous days in the financial history of the United States. On Friday, Sept. 24, 1869, a panic was caused in Wall Street by the effort of Fisk and Gould to corner the gold market, gold rising to 163½, and on Friday, Sept. 19, 1873, occurred in the New York Stock Exchange the great financial crash which was followed by the widespread "panic of 1873." For "Black Friday" of 1869 consult *The Yale Review*, vol. iii (New Haven, 1896); and Andrews, *The United States in our own Time* (New York, 1903).

In England the name is given to Dec. 6, 1745, the day on which news reached London that the Pretender had arrived at Derby; again, May 11, 1866, when the failure of Overend and Gurney brought on a disastrous panic. Consult *Julgar's Short History of Fables* (New York, 1893). Good Friday is also known as Black Friday in the Western church, because on that day clerical vestments and altar draperies are black.

BLACK GAME, or HEATH GAME. See BLACKCOCK.

BLACK GUARDS. A name originally applied to the scullions and lower servants of the English court, who were clothed in black garments. Gibbon says "those who carried coals to the kitchen, rode with the pots and pans, and were in derision called the Black Guards." The title is recognized in an official proclamation of 1683, which begins, "Whereas, a sort of vicious, idle, and masterless boys and rogues, commonly called the Black Guard, with divers other lewd and loose fellows," etc.

BLACK GUM, or SOUR GUM. The popular name of the *Nyssa sylvatica*, the pepperidge and tupelo of our Middle and Southern States. It grows in thick forests, usually in or near swamps, and attains a height of 80 to 90 feet, has crooked branches, and is densely covered with bright-green leaves in tufts at the ends of the branches, bears flowers of greenish hue, ovoid fruits, becoming blue-black as they ripen; wood close-grained and very tough, but not durable. The timber is used for hubs of wheels and in other places where splitting is to be avoided. It is planted as an ornamental tree in England.

The cotton, or Tupelo gum, of the Southern

States is *Nyssa aquatica*, a tree 80 to 100 feet high, with light but not strong wood, extensively used for woodenware, fruit and vegetable boxes, etc. The wood of the roots is very light and is sometimes used for floats for fish nets. Sour tupelo, or Ogechee lime, is *Nyssa ogeche*, a smaller tree, that bears edible fruits.

BLACK HAWK (1767-1838) A celebrated chief of the Sac Indians. In 1788 he succeeded his father as head chief of the Sacs. In 1804 the Sacs and Foxes agreed, for an annuity of \$1000, to give up to the United States their lands east of the Mississippi, but Black Hawk promptly repudiated this arrangement, and in the War of 1812 took part against the United States. The cession of the disputed territory was again provided for by treaties in 1815 and 1816, the latter being signed by Black Hawk, and in 1823 the majority of the Sacs and Foxes, under Keokuk (qv), moved across the Mississippi, a new treaty being signed at Prairie du Chien, on July 15, 1830. When the whites began to occupy the vacated lands, Black Hawk threatened retaliation and by crossing the Mississippi with a small force in June, 1831, precipitated the Black Hawk War. The Indians were defeated by General Dodge, near the Wisconsin River, on July 21, 1832, and by General Atkinson, at the Bad Axe River, August 1-2, and Black Hawk surrendered on August 27. He and nine other warriors were held for a time as hostages, and after being taken to several Eastern cities, were confined in Fortress Monroe until June 8, 1833. The Sacs and Foxes under Keokuk soon moved to a reservation near Fort Des Moines, where Black Hawk died, Oct. 3, 1838. Consult Pattison, *Life* (Boston, 1834), Drake, *Life* (Cincinnati, 1846). Also consult an article, "Story of the Black Hawk War," by Thwaites, in vol. vii of the *Collections of the Wisconsin State Historical Society* (Madison, 1885), id., "Chapters in Fox River Valley History," ut supra (Madison, 1913), Frank E. Stevens, *The Black Hawk War* (Chicago, 1903), Wakefield's *History of the Black Hawk War*, edited by F. E. Stevens for the Caxton Club (Chicago, 1908).

BLACKHEAD 1 A scaup duck (See SCAUP). 2 A minnow (*Pimephales promelas*). 3 A minute blemish in the skin, making a dark spot, a comedo.

BLACKHEAD (so named because the disease affects the color of the head), or ENTEROHEPATITIS. A malignant, contagious disease of turkeys, due to the attack of protozoan parasites (*Amoeba meleagridis*, or *Eimeria (Oococcidium) anatum*). Birds attacked by the disease show loss of appetite, weakness, and emaciation. Diarrhea is a pronounced and constant symptom. Discolorations of the head and comb frequently occur, from which the disease takes its name. Young birds seem to be most susceptible to the disease. Little success has attended remedial treatment of blackhead. Reliance must be placed for the most part on prevention, for which purpose roosting places and feeding-grounds should be thoroughly disinfected by means of carbolic acid or other chemicals, isolation of sick birds from the flock and feeding on easily assimilable feed. Turkeys apparently resist the disease better in warm, dry weather than in wet weather. See DIARRHEA, WHITE, OF CHICKS.

BLACKHEATH An elevated, open common, in the southeast of London, England,

lying chiefly in the metropolitan borough of Lewisham. It covers 267 acres, commands a fine view of great extent, and, being a healthful tract, many villas have been built on its margin. There is a tradition that golf was first played in England here by King James I and some of his Scottish adherents in 1608. The Roman road to Dover crosses it. Blackheath was the scene of several insurrections, including those of Wat Tyler (1381) and Jack Cade (1450), and was also a noted place for highwaymen. Consult Drake, *History of Blackheath* (London, 1886).

BLACK HILLS A name applied at various times to different sections of country lying between the Missouri River and the Rocky Mountains, but now used only to indicate a mountainous region partly in northeastern Wyoming, but principally in South Dakota (Map South Dakota, B 5). They cover a total area of about 6000 square miles, 1893 square miles of which have been set apart by the United States government as a forest reserve (See FOREST RESERVES). They are drained and nearly surrounded by the two main forks of the Cheyenne River (qv). Their altitude ranges from between 2500 and 3000 feet at their base, to the summit of Harney Peak, 7216 feet in height. The mountains were formed by a local uplift, which raised the Archean and later formations into a concentric fold. The Black Hills district was first partly explored in 1874 by an expedition under General Custer, when gold was discovered. In 1876, after some hostilities, a treaty made with the Sioux Indians opened the country to settlement, and Deadwood, Central City, Lead City, and other towns grew up very rapidly. The Black Hills constitute one of the richest gold-mining districts in the United States and have yielded over \$100,000,000. Silver, copper, tin, and iron ores also occur within their limits, besides coal, salt, petroleum, mica, gypsum, and building stone. About one-third of the area is covered with dense dark forests of pine, whence the name, while deciduous trees are abundant. The climate is salubrious, the soil fertile, and the hills are well adapted to grazing purposes. See SOUTH DAKOTA.

BLACK HOLE An appellation familiarly given to a dungeon or dark cell in a prison. The name is generally associated with the horrible confinement of a party of English in an apartment called the "Black Hole of Calcutta," on the night of June 20, 1756. The garrison of the fort connected with the English factory at Calcutta was captured by the Nawab Siraj-ud-Daula, who caused all of the prisoners taken, 150 in number, to be confined in an apartment 18 feet by 14 feet and 10 inches. This cell had only two small windows, obstructed by a veranda. The crush was dreadful, and after a night of excruciating agony from pressure, heat, thirst, and want of air, there were in the morning only 23 survivors. One of them, Mr. John Z. Holwell, published a narrative of their sufferings in 1758. See HINDUSTAN, also Macaulay's essay on Clive.

BLACK HORSE (a fish). The Missouri or gourd-seed sucker (*Cylopterus elongatus*), usually about 2 feet long, "a peculiar species with small head, elongate body, and jet-black coloration, which comes up the smaller rivers tributary to the Mississippi and Ohio in large numbers in the spring." See PLATE OF SUCKERS.

BLACKIE, JOHN STUART (1809-95). A Scottish philologist. He was born in Glasgow

in 1800, but received his early education in Aberdeen, where his father was agent for a bank. After going through the usual course of a Scottish university education—partly at Marischal College, Aberdeen, partly at Edinburgh—with a view to the Church, he went in 1829 to Germany and studied for some time at both Göttingen and Berlin. He thus acquired a mastery of German and an acquaintance more extensive than ordinary with German literature. On his return, having abandoned the thought of entering the Church, he began the study of law and passed as advocate at the Edinburgh bar in 1834. But he soon found the practice of the profession uncongenial and devoted himself thenceforth to literary pursuits. Among his earliest productions was his translation, into English verse, of Goethe's *Faust* (1834). He wrote also about this period numerous articles in the *Foreign Quarterly Review*, the *Westminster*, *Blackwood*, and *Tait*, chiefly on German subjects. In 1841, on appointment by the crown, he became professor of humanity (Latin) in Marischal College, which chair he held until, in 1852, he was elected to the Greek chair in the University of Edinburgh. From the beginning of his professional career he had been incessant in advocating educational reform in Scotland and took an active part in the movement that led, in 1859, to the remodeling of the Scottish universities. During 1874-76 he advocated throughout the country, with great enthusiasm, the foundation of a Celtic chair in Edinburgh University and was successful in raising upward of £14,000 for its endowment. Of works of a professional and philological kind may be mentioned the lectures *On the Studying and Teaching of Languages*; *On the Rhythmical Declamation of the Ancients*; *The Pronunciation of Greek*; *Accent and Quantity* (1852). Among the most matured and scholarly of his productions is his metrical translation, with notes, of the dramas of *Æschylus* (1850). In 1853 he spent above three months in Athens acquiring a knowledge of the modern language; and as fruits of the visit there appeared articles on the subject in the *North British* and *Westminster* reviews. In 1886 he published *The Iliad of Homer*, translated into English verse, with commentary and introductory dissertations, in which he endeavored to present Homer to the English reader as a popular singer; he maintained the unity of the Homeric poems. He resigned his professorship in 1882 and died March 2, 1895.

Besides his works on philological and educational subjects, Blackie made excursions into other fields. In 1858 he published a treatise on *Beauty*, in refutation of Lord Jeffrey's association theory. Others of his works are *Lays and Legends of Ancient Greece, with other Poems* (1857); *Lyriical Poems* (1860); *Musa Burschicosa* (1869); *War Songs of the Germans*, a translation (1870); *Four Phases of Morals* (1871); *Songs of the Highlands and Islands* (1872); *Self-Culture* (1873); *Horæ Hellenicæ* (1874); *Songs of Religion and Life* (1876); *Natural History of Atheism* (1877); *Lay Sermons* (1881); *The Wisdom of Goethe* (1883); *Life of Burns* (1887); *Essays on Subjects of Moral and Social Interest* (1890).

BLACKING. A preparation employed for producing a black, glazed, shining surface on leather. There are numerous recipes for making blacking, but they all involve the use of a

pigment, which is usually ivory black, bone-black, or lampblack, mixed with a vehicle which is usually some combination of oil, vinegar, beer, molasses, water, and hydrochloric or sulphuric acids. Blacking intended for harness usually has glue, gelatin, gum arabic, beeswax, suet, soap, shellac, or some resinous compound added to the vehicle. The fact that the addition of sulphuric acid to ivory black and sugar produces sulphate of lime and soluble acid phosphate of lime, which makes a tenacious paste, is the foundation of many of the compositions used as blacking. The famous English blacking known as Day and Martin's consists of bone-black, sperm oil, molasses, vinegar, and sulphuric acid. These ingredients, when mixed together in the order named, produce a thick, tenacious paste, which is lugged by the addition of vinegar and put into stoneware bottles. A familiar recipe for a liquid blacking is as follows: eight ounces of ivory black; 6 ounces of brown sugar; 1 ounce of sweet oil, triturate until the oil is thoroughly mixed in, then add one pint of stale beer. A paste blacking which may be easily made consists of ivory black, 4 pounds; molasses, 3 pounds; hot sperm oil, 9 ounces; gum arabic, 1 ounce, and vinegar, 12 ounces. These ingredients are mixed together and allowed to stand for about a week, with an occasional stirring, when the blacking is ready for use. By adding more vinegar the compound may be liquefied. A well-known recipe for harness blacking is as follows: beeswax, 1 pound; ivory black, $\frac{1}{4}$ pound; Prussian blue, 1 ounce; ground in 2 ounces of linseed oil; oil of turpentine, 3 ounces; copal varnish, 1 ounce; mix well together and form into cakes while warm. In founding (see **FOUNDING**) the name "Blacking" is given to various washes of powdered charcoal, sea coal, or graphite with which the surfaces of models are coated to give the casting a smooth surface and to prevent the molten metal from penetrating the same.

BLACK-JACK. The name given by miners to zinc sulphide or blende, which is of black color. It was also the name applied in former times to a kind of drinking flagon made of hardened leather.

BLACK KNIGHT, THE. 1. The name of a character in the early romances, son of Oriana and Amadis of Gaul. 2. Richard Cœur de Lion was known in Scott's novel *Ivanhoe* as The Black Knight or The Black Sluggard, on account of the suit of black armor and the black shield he bore during his wanderings in England.

BLACK KNIGHT, COMPLAINT OF THE. A poem written by Lydgate, but erroneously included in some of the early editions of Chaucer.

BLACK LAKE. A town in Megantic Co., province of Quebec, Canada, situated on the Quebec Central Railway, 55 miles south of the city of Quebec (Map: Quebec, G 4). It has various manufactures. Pop., 1901, 1216; 1911, 2045.

BLACK LAW. In American history, a name applied to any one of a series of laws, passed in various border and Northern States before the Civil War, sharply discriminating against free negroes who wished to emigrate to such States and become citizens thereof. Thus, in some States, certificates of freedom were to be filed, negroes were to be rigidly excluded from the militia and from the public schools, and no negro was to testify in cases in which any white man was directly interested. More

or less stringent laws were passed in Virginia, Maryland, Delaware, Mississippi, Indiana, Illinois, Iowa, Oregon, and New Mexico (Consult Wilson, *Rise and Fall of the Slave Power in America* (Boston, 1872-75))

BLACK LEAD See GRAPHITE

BLACK LEG (so named because the tumors affect the legs oftener than other parts of the body), **BLACK QUARER**, or **SYMPTOMATIC ANTHRAX** An infectious disease due to the action of *Bacillus chauveaui*. It is confined almost entirely to cattle, but cases have occurred also in sheep, goats, camels, pigs, and horses. Man is immune to it. The disease is characterized clinically by the development of tumors in the muscles of various parts of the body, producing, when stroked, a crackling sound, which serves to distinguish this disease from anthrax. After death the tumors become infiltrated with blood and serum containing gas bubbles, and thus again distinguishes blackleg from anthrax, as the tumors of the latter are not found to contain any gas. Further, in blackleg the spleen is not affected and the blood coagulates quickly, while in anthrax the spleen is much enlarged and the blood clots more slowly. Blackleg has long been known as a disease of cattle, but has, until within recent years, been generally confused with anthrax. It may also be mistaken for malignant edema. The appearance of the swellings, which are restricted to certain regions and to young animals, in those parts of the body with abundant musculature is indicative of blackleg. The blackleg bacterium does not develop in the presence of free oxygen. In the blood it is slightly motile. The symptoms of blackleg are loss of appetite, debility, and great elevation of temperature. The disease runs its course very rapidly and is fatal in nearly all cases. Cattle between the ages of six months and four years are most susceptible, young calves and old animals being more resistant. Fat cattle seem to be especially liable to infection. The symptoms usually appear suddenly within from one to three days after infection. The tumors may develop at once or may be preceded by the symptoms of fever and trembling. A lameness of the legs is usually observed and is due to the muscular tumors which almost always accompany the disease. The animal manifests considerable pain and falls to the ground soon after the development of the first symptoms. The part which is most affected becomes swollen and assumes a black or blue color, which is due to the infiltration and coagulation of blood within it. In many cases natural infection takes place through wounds, but it more frequently results from the consumption of infected feed or drinking water.

Blackleg is found in nearly all countries of the globe. In the mountains of France it is known as *mal de montagne*, in Denmark as *rosksyge*, and in Germany as *Rauschbrand*. In the United States it is most prevalent in Texas, Kansas, Nebraska, South Dakota, and Colorado.

Medical treatment of blackleg has been uniformly unsuccessful and is not to be recommended. On the other hand, preventive vaccination has given very satisfactory results. Out of 500,000 cattle vaccinated in Europe, only one-half of one per cent. subsequently died of blackleg. Equally striking results have been obtained by the Bureau of Animal Industry of the United States Department of Agriculture. This bureau has perfected a method of producing immunity

against blackleg by one vaccination, requiring less time than the old method, in which two inoculations were made, with an attenuated and strong vaccine, respectively. Stockmen may now obtain the vaccine and inoculate their own cattle. For further study of blackleg, consult "Special Report on Diseases of Cattle," *Report of United States Department of Agriculture* (Washington, 1912), *Bureau of Animal Industry, 15th Annual Report*, p. 27, Butya and Marek's *Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. 1, Hoate's *System of Veterinary Medicine*, vol. 1.

BLACK LETTER (*Black Letter*). A name commonly applied in England and America to the printing types which are most generally known on the Continent as Gothic, in contradistinction to the Roman type that came into use subsequently. The first printed books imitated every peculiarity of the contemporary manuscripts, and, as printing was first practiced in Germany and the Netherlands, the first types were copies of the letters in use in those countries in the middle of the fifteenth century. Two sorts of letters have been employed in the writings of Western Christendom. The Gothic style dates from about the middle of the twelfth century, the type which imitated it, first used c1445, spread with the art of printing into most European countries, until the classical taste reverted to the more graceful letter known as Roman, which is a revival of what is known in paleography as the Caroline minuscule, of the kind used in the eleventh and twelfth centuries. Aldus in 1501 attempted to supersede the Roman letters by what have been called Aldine or Venetian, but are best known as Italic characters. These can scarcely be said to have come into much more than temporary or exceptional use, while the Roman letters rapidly spread from Venice all over the west of Europe. Although thus supplanted in general use, the Gothic or Black Letter was long retained for special purposes, such as the printing of Bibles, prayer books, proclamations, and acts of Parliament. Characters similar to the Black Letter still continue to be used in Germany, but of late hygienic considerations have led to a movement in favor of a general adoption of the Roman letter even there. For specimens of all the types used in England in the fifteenth century, consult Duff, *Early English Printing* (London, 1896).

BLACK LIGAMENT See BLACK DROP

BLACK LILY See FRITILLARY

BLACK LIST A list of persons, either (1) against whom the compiler would warn others, or (2) with whom he refuses to have business transactions, or (3) with whom he seeks to induce others not to have business relations. An example of the first class in England is the official list of defaulters on the Stock Exchange, in the United States, the list of those against whom unsatisfied judgments are standing, or who have given chattel mortgages on stock in trade, or whose credit is poor. These and similar lists are published by mercantile agencies and others, and are considered not only valuable to the business community, but usually fair and lawful. And yet printing a person's name in such a list may subject the publisher to an action for libel. In order to defend successfully such an action, the publisher must prove that the statement made in the list about the plaintiff was true, or else that it was a correct transcript of a public record, or a fair and accurate report of a

judicial proceeding, or that it was made upon a privileged occasion. Such a statement is privileged when it is made in answer to questions by persons having a legitimate reason for asking them. as when A, to whom B has applied for credit, inquires about B's financial condition. An example of the second class of black list is one kept by a railroad company of persons dismissed from its employment for incompetency, discourtesy to patrons, or other cause, in order that its agents may not reengage them. The third class is illustrated by lists, kept by manufacturers or dealers forming an association or combination for the control of a particular line of business, of those who refuse to come into the association; or by lists kept by labor unions of non-union workmen or of those employing such workmen, with a view of preventing the employment of the blacklisted workmen or of boycotting the employers. In some States of the United States blacklisting has been made a misdemeanor by statute, punishable by fine or imprisonment. Consult the authorities referred to under the titles LIBEL and CONSPIRACY, and Eddy, *Law of Combinations* (Chicago, 1901). In England the term "black list" is also applied to the official list kept by the police authorities of persons who have been convicted under the Inebriates Act, 1898, as habitual drunkards. The person so "blacklisted" is forbidden to obtain from any licensed tavern, inn, or club any intoxicating liquor during three years after such conviction, nor is any licensed person or club permitted to supply him. A violation of the prohibition is dealt with as a misdemeanor. Consult Licensing Act, 1902, 2 Edw. VII, c. 28. See also BOYCOTTING.

BLACK/MAIL (*black + mail*, a small piece of money, rent, tribute, Fr. *maillie*, OF. *maaille*, LL. *medalla*, medal). A term which has three distinct significations in English law: 1. It was applied to rents received in work, grain, or baser money, as distinguished from rents received in silver or white money (*mailles blanches*). (See RENT.) 2. It was applied to the tribute levied by freebooters, in the four northern counties of Northumberland, Westmoreland, Cumberland, and Durham. By 43 Eliz., c. 13, § 1 (1601), it was made a felony without benefit of clergy to pay or receive this tribute, or blackmail, and similar legislation was enacted in Scotland. The practice does not appear to have ceased until after the legislative union of Scotland and England. 3. At present it is applied both in England and the United States to the criminal offense of attempting to extort money or property by threats of various kinds. These threats are usually to accuse a person of a crime, or to injure his person or property, or to defame him, or to impute to him some deformity or disgrace. As a rule, it is no defense to the charge of blackmailing that the person threatened with exposure of criminal or shameful conduct is guilty of the offenses imputed to him, nor that the attempt at extortion fails. The criminality of the offense consists in its tendency to induce a breach of the peace, and in some cases its tendency to pervert justice. By some statutes only written threats made for the purposes of blackmail are punishable criminally, but in most of the States, as in England, the offense is the same whether the threats are made orally or in writing. Consult the authorities referred to under CRIMINAL LAW, and see EXTORTION.

BLACK/MAR, FRANK WILSON (1854-). An American economist and educator; born at West Springfield, Pa. He was educated at the University of the Pacific, and at Johns Hopkins, where he was an instructor in history in 1887-88, and fellow in history and politics in 1888-89. From 1889 to 1899 he was professor of history and sociology at the University of Kansas, and was appointed to the chair of sociology and economics there in the latter year. In 1897 he organized the graduate school of the university and was elected its dean. He was at one time prominent in the promotion throughout the West of the university extension movement, speaking and writing extensively on topics of history, economics, and sociology. He edited the *Cyclopedia of the History of Kansas*. His publications include *Spanish Colonization* (1890), *Spanish Institutions in the Southwest* (1891); *History of Higher Education in Kansas* (1900); *Life of Charles Robinson, the First Governor of Kansas* (1900); *The Elements of Sociology* (1905); *Economics for High Schools* (1907); *Play-grounds and Parks* (1910).

BLACK MONDAY. A name applied to any Monday marked by a memorable disaster. In 1209 some 500 of the English who had settled at Dublin, while they were celebrating Easter Monday, were massacred at Collenswood by the native Irish of the neighborhood. Easter Monday was long celebrated as Black Monday by Dublin. Two such days occurred within a short period of English history, and both, by a curious coincidence, were Easter Mondays. In 1351 there was a tremendous hailstorm, and many people perished from cold. Nine years later, when the army of Edward III was lying before Paris, another severe storm cost the lives of a large number of men and horses. The impression of these calamities was so lasting that Shakespeare used the expression colloquially (*Merchant of Venice*, Act II, Scene 5).

BLACK MONKS. See AUGUSTINIANS.

BLACK/MORE, SIR RICHARD (c.1650-1729). One of the court physicians in the reigns of William III and Anne. He is remembered as the most heavy and voluminous poetaster of his time. Besides numerous essays Blackmore wrote at least six long epic poems: *Prince Arthur*, *Bliza*, *Alfred*, *The Redeemer*, *Nature of Man*, and *The Creation*. The last named was pronounced by Addison to be "one of the most useful and noble productions in our English verse." It was also praised by Johnson. But few modern readers are likely to agree with these judgments. Blackmore, who appears to have been a good and well-meaning man, was ridiculed without mercy by Pope and other wits of the time, and his poems are really worthless. Consult: Johnson, "Blackmore," in *Lives of the Poets* (London, 1779-81); the *Spectator*, No. 339; the *Dunciad*, bk. ii, pp. 259-268 (London, 1729).

BLACKMORE, RICHARD DODDREDGE (1825-1900). An English novelist. He was born at Longworth, Berkshire, June 7, 1825; the son of Rev. John Blackmore. Graduating from Exeter College, Oxford, in 1847, he was called to the bar five years later and practiced as a conveyancer till his health failed. He then took up fruit growing at Teddington, a little way up the Thames from London. He died at Teddington, Jan. 20, 1900. He began his literary career as a poet, publishing *Poems by Melancton* (1853); *Epullia* (1854); *The Bugle of the Black Sea*

(1855), *The Fate of Franklin* (1860), and a translation of Vergil's *Georgics* (complete in 1871). His first novel, *Clara Vaughn*, appeared in 1864. It was followed by *Chadock Novell* (1866), *Lorna Doone* (1869), *The Maid of Sker* (1872), *Alice Lorraine* (1873), *Cripps the Carrier* (1876), *Emma* or, *My Father's Sin* (1877), *Mary Anselley* (1880), *Christovell* (1882), *Remarkable History of Tommy Upmore* (1884), *Springhaven* (1887), *Kit and Kitty* (1889), *Polydross* (1894), *Fringilla* (1895), *Tales from the Telling-House* (1896), *Daniel* (1897). Though Blackmore thought some of his other books better than *Lorna Doone*, his reputation rests almost wholly upon this romance of the seventeenth century. It abounds in beautiful descriptions, is elevated in tone, and is written in a rhythmic prose which is rare in our literature. It has made Exmoor and the neighboring district famous. Consult F. J. Snell, *Blackmore Country* (New York, 1906).

BLACK MOUNTAINS A mountain group in Buncombe and Yancey counties, North Carolina, forming a spur of the Blue Ridge and a part of the Appalachian system (Map North Carolina, B 4). They lie between the French Broad River and its main tributary, the Nolichucky, and have a northwest and southeast trend transverse to the main line of the Blue Ridge elevations. The Black Mountains are the culminating points of the Appalachian system. Mount Mitchell, the highest peak, is 6711 feet, and Balsam Cone, Black Brothers, Hany Bear, Cattail Peak, Mount Gibbs, and Mount Buckley are more than 6500 feet above the sea. They form the divide between the Tennessee and Catawba river basins. Their slopes are forested with evergreens, while their valleys in places contain rich soil that is well adapted for agricultural purposes. See APPALACHIANS, BLUE RIDGE.

BLACK OAK See OAK.

BLACKPOOL (so named from a pool now drained, Ir and Gael *poll*, hole, pit, bog, AS *pōl*, Ger *Pfuhl*, pool, puddle) A flourishing town and popular watering place of Lancashire, England, on the Irish Sea, about 46 miles north of Liverpool. It is sometimes called the "Brighton of the North" (Map England, C 3). It has an excellent bathing and promenade beach, a fine esplanade, three piers, a winter garden and pavilion, an aquarium, and theatres. The principal streets and piers are lighted by electricity. Blackpool was incorporated as a borough in 1876 and as a county borough in 1904. Its water supply is obtained from the Fylde water works, managed by a board composed of representatives from Blackpool, Flatwood, Lytham, and St. Anne's-on-the-Sea. The town owns its gas works, electric light plant, markets, slaughterhouses, and cemeteries. It also owns its street railways, which are operated by the overhead trolley system, and has a line connecting Blackpool with Lytham, another favorite bathing place, and St. Anne's-on-the-Sea. There are a technical school, a so-called continuation school, three public libraries, and a hospital. A branch railway connecting Blackpool with the Preston and Wyre Railway affords easy access from Preston, Liverpool, Manchester, and all parts of the kingdom. Blackpool is annually visited by over 100,000 tourists. Pop., 1891, 23,846, 1911, 58,376.

BLACK PRINCE See EDWARD, THE BLACK PRINCE.

BLACK QUARTER See BLACKLEG.

BLACK RACER See BLACKSNAKE.

BLACK RAIN. Showers of black rain have been recorded on many occasions in Ireland and less frequently in other portions of Europe. The blackness comes from various sources, such as the soot from city fires and especially forest fires, which is washed down by rain, black fungi of fungus spores—such as produce smut, mildew, and rust—carried up by gusts of wind and subsequently falling with the rain. In a few special cases the spores of fungi, after being wetted by the rain, grow rapidly on the ground and produce a black coating, which has not necessarily fallen with the rain, but is often spoken of as black rain. See DUST, ATMOSPHERIC.

BLACK RIVER. A river in northern New York, rising in the southwestern part of the Adirondack region and flowing southwest, then northwest, 130 miles through Herkimer, Oneida, Lewis, and Jefferson counties to Black River Bay, at the extreme eastern end of Lake Ontario (Map New York, E 2). Numerous falls and rapids, with great possibilities for development, furnish abundant water power to half a dozen villages and the city of Watertown. From Lyons Falls to the mouth of the river, a distance of 72 miles, the fall is about 500 feet. Boats pass from this river just above Lyons Falls to the Erie Canal at Rome, N. Y., through the Black River Canal.

BLACK RIVER, or BIG BLACK. An affluent of White River, which, rising in Reynolds Co., Mo., and flowing through Missouri, bends toward the southwest, enters Arkansas, and joins the White River, a few miles above Newport, Jackson County (Map Missouri, F 5). It is about 400 miles long and is navigable for about 100 miles, except in the dry season. Valuable timber is found along its banks, and the lower regions produce good crops of cotton.

BLACK RIVER FALLS. A city and the county seat of Jackson Co., Wis., 171 miles northwest of Milwaukee, on Black River, and on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map Wisconsin, C 4). Falls on the Black River afford extensive water power, and in the vicinity are granite quarries and deposits of iron and kaolin. The city has also flour mills, a brewery, a foundry, machine shops, and nurseries, and is the commercial centre for a large agricultural district. The water works and electric light and power plant are owned by the municipality. The business portion of the city was almost entirely destroyed by a flood in 1911, the property loss amounting to more than \$1,000,000. It has been rebuilt, and a solid concrete wall erected for protection against floods. Pop., 1890, 2261, 1900, 1938, 1910, 1917.

BLACK ROCK See BRIDGEPORT, CONN.

BLACK ROD, USHER OF THE (so called from the staff he carries). An officer of the House of Lords. He is chief gentleman usher to the sovereign and belongs to the Order of the Garter. His principal duty is to summon the House of Commons to the Lords when the royal assent is given to bills, or when royal speeches are read, and to take into custody any peer guilty of breach of privilege. The office also exists in the self-governing British commonwealths of Canada, Australia, and Cape Colony.

BLACK ROD OF SCOTLAND (*Rod*, a representation of Christ crucified, AS *rōd*, cross, akin to OS *rōda*, Dutch *roede*, rod). A famous relic brought to Scotland (c 1070) by Margaret,

wife of King Malcolm. It was a black rood of ebony which was believed to be a portion of the cross on which Christ was crucified and was held in the highest veneration by the Scotch kings. It fell into the hands of the English during the invasion of that country by David II in 1346.

BLACK ROT. See GRAPE.

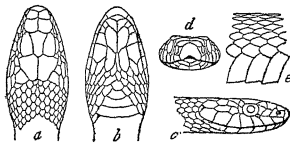
BLACK SALSIFY. See SCORZONERA.

BLACK SEA (Lat. *Pontus Euxinus*, Gk. *Ἰόντος Εὐξείνος, Pontos Euxeinós*, hospitable sea, originally *ἄλγεινος, alexinós*, inhospitable; Turk. *kara deniz*, black sea). An inland sea lying between eastern Europe and Asia Minor and connected with the *Ægean* Sea by the Bosphorus, the Sea of Marmora, and the Dardanelles (Map: Europe, G 4). It is bounded on the north by European Russia; on the east by Caucasus; on the south by Asia Minor; on the west by European Turkey, Bulgaria, Rumania, and Russia. It has a length from east to west of about 750 miles, a greatest width of 380 miles, and covers an area (not including the Sea of Azov) of about 165,000 square miles. The Crimean Peninsula projects into the Black Sea from the north, forming the Sea of Azov and the Gulf of Perekop. The former is almost entirely cut off from the Black Sea and is very shallow. The Black Sea is very deep; the floor of a great part of the central basin lies more than 6000 feet below the surface, and the greatest depths considerably exceed 7000 feet. The Black Sea receives the drainage of a large part of central Europe through the Dnieper, Dniester, Bug, and Danube; of a considerable section of eastern Russia through the Don (which flows into the Sea of Azov); of the western Caucasus region through the Kuban and a number of smaller rivers; and of northern Asia Minor through the Tehoruk, the Yeshil Irmak, the Kizil Irmak, and the Sakaria. Tidal action is scarcely perceptible, but the sea level rises and falls with the increase and decrease in volume of the tributary waters. There is a strong surface current setting towards the Bosphorus, and an undercurrent flowing in an opposite direction from the *Ægean* Sea. The latter current is heavy and saline, and to its agency is due the phenomenon that the waters of the Black Sea contain nearly 2 per cent of salt, although constantly fed by large rivers. The Black Sea is visited by severe storms of both local and general character. On the north shore the southerly winds are most dreaded, while near the Bosphorus the so-called *porcias* from the northeast are particularly violent. The climate, notwithstanding its southern position, is marked by considerable severity. In winter heavy fogs form, which obscure the sunlight and lend a dark aspect to the waters, thus partially justifying its name. The Black Sea is of great economic importance to the Russian Empire, as it furnishes an outlet for the extensive agricultural region of the south. Communication is maintained with the Caspian Sea by a railway from Baku to Batum, between which points there is also a pipe line for the transport of petroleum. The principal ports on the Black Sea are Odessa, Poti, and Batum, in Russian territory, and Samsun and Trebizond, in Turkey. There are no islands worthy of mention.

BLACK SILVER. A name given, on account of its color, to the mineral stephanite (q.v.) which is a silver sulphantimonite found

in Saxony, Mexico, Nevada, and elsewhere, and valued as an ore of silver.

BLACKSNAKE, or **BLACK RACER**. A common colubrine serpent (*Zamenis* [formerly *Bascanium*] *constrictor*), prevalent over eastern North America from Canada to Florida. It is slender in form, but rarely if ever exceeds 6 feet in length. The color of Eastern adults is uniform, lustrous pitch-black above and slate-color beneath, sometimes tinged with greenish white, lower jaw, chin, and sometimes edges of the upper-lip plates, white; tongue, black. Specimens from the West and Southwest represent a distinct color variety, *flaviventris*, exhibiting a more or less bright olive green, with the whole under surface greenish white to bright yellow; hence the Western names "blue racer," "yellow-bellied," and "green racer." The young under about 18 inches long are variegated with dark blotches upon dusky olive, with light margins on the scales, especially along the sides, but there is considerable variation from dark to very pale gray. This is one of the most ubiquitous, numerous, and vigorous of Ameri-



THE BLACKSNAKE.

a, top of head, b, under side; c, profile, d, face; e, arrangement of body scales.

can snakes. It is at home on the ground, where it runs with amazing swiftness; but it is also an expert climber, scaling trees and searching their topmost branches, many yards above the ground, with as great ease as it explores bushes and rocks; it will leap more than its own length from tree to tree when in haste. It is also a swift and powerful swimmer and seeks much of its food in swamps and along streams. Its food consists mainly of frogs, toads, other snakes, small mammals, birds and their young, and eggs, together with some insects. These are captured by a stealthy approach and swift stroke or chase and more often by night than by day. It is very useful to the farmer in destroying great numbers of moles and mice, but also is the most indefatigable and successful searcher for birds' nests.

For years it has been supposed that objects of special animosity to the blacksnake are the copperhead and rattlesnake, whose trail it has been said to follow by scenting, like a dog; and, having overtaken one of these sluggish reptiles, it leaps upon it, avoiding the stroke by its swiftness, catches it by the back of the neck, and wrapping itself about it, crushes, bites, and shakes the life out of it, after which it swallows it whole. This is absolute fiction, for the only interest which this serpent takes in others of its kind is in the case of small ribbon or garter snakes, which indeed it kills but *not* by constricting. When held in the hand, a blacksnake will sometimes coil about the arm of a man, as it would brace itself among the branches of a tree, but the pressure could not injure a child, and the snake may readily be

unwound with one hand. The blacksnake is altogether harmless to man, and even when teased until it bites, it can inflict only the merest scratch. It has courage and will sometimes advance toward a man, but will flee at full speed if approached closely. Large ones are easily killed by quite small dogs, and among its enemies are all the carnivora, especially, perhaps, the skunk and badger. It is inclined to frequent a limited area continuously.

These serpents hide away in hollow stumps and underground dens at the approach of cold weather, where often several will entangle themselves into a ball for mutual comfort and remain torpid until spring. They breed during the summer, the female—which is larger and darker than the male—laying 15 or 20 eggs in a hollow in a sunny bank, amid the dry dust of a decaying stump, under flat stones, or perhaps within an old dung heap. There is no direct proof of the statement that the mother remains near the eggs until the young hatch and then takes care of them and defends them from danger. This snake is tamable, but individuals differ in temperament and docility, some showing much intelligence and kindness, while others are mischievous. Several other species of the genus belong to the southwestern United States, Mexico, and the West Indies, and the Texan whip snake (qv) is a near relation. The chain snake is sometimes called "mountain blacksnake." Other blackish serpents known as blacksnakes include a colubrine of Jamaica (*Oxyophis ater*), the death adder (qv) of Australia and Tasmania, and some others, notable for dark hues. See PLATE OF SNAKES, AMERICAN HARMLESS.

BLACK SNAKE-ROOT. See CORNUS.

BLACKSTONE A town in Worcester Co., Mass., 2 miles northwest of Woonsocket, R. I., on the Blackstone River and on the New York, New Haven, and Hartford Railroad (Map Massachusetts, D 3). It has a public library and extensive manufactures of cotton, woolen, rubber, and felt goods. The government is administered by town meetings held once a year to pass on matters relating to appropriations, bridges, highways, etc. Settled about 1700, Blackstone was separated from Mendon in 1845 and named in honor of William Blackstone, the first settler on the site of Boston. Pop., 1900, 5721, 1910, 5648. Consult *History of Worcester County* (2 vols., Boston, 1897).

BLACKSTONE, WILLIAM (?-1675) An early colonist in New England. He left England to avoid the dictation of the Church of England and was the first white man to settle on the site of Boston, Mass. (1623). To escape the arbitrary and dictatorial methods of the Puritans he sold his 800 acres of land for £30 in 1634, and became the first white settler within the limits of the present Rhode Island. Consult Winsor, *Memorial History of Boston*, vol. 1 (Boston, 1880).

BLACKSTONE, SIR WILLIAM (1723-80) A celebrated English jurist and law writer. He was the son of a silk mercer in London and was born there July 10, 1723. At the age of 15, having obtained a scholarship from the Charterhouse School, where he was educated, he was sent to Pembroke Hall, Oxford. There he was fortunate enough to obtain a second scholarship and remained till, in 1744, he was admitted a fellow of All Souls' College. During this period he divided his time between Oxford and London,

attending the courts of law at Westminster with the view of qualifying himself for his future profession. In 1746, at the age of 23, he was called to the bar, where his success was for some time in doubt. However, in 1749, he was appointed to a minor judicial office—that of recorder of Wallingford, in Berkshire.

In 1753 he was a candidate for the chair of civil law at Oxford, but, failing to receive the appointment, he went nevertheless to the university and delivered a course of academic lectures on English law which attracted wide attention. In the next year he published *An Analysis of the Laws of England*, based on Sir Matthew Hale's *Analysis of the Civil Part of the Law*, which he greatly admired as "the most natural and scientific of all the schemes hitherto made public for digesting the laws of England."

A few years later, a Mr. Viner, the celebrated author of Viner's *Abridgment*, having left a large sum of money to endow a chair of English law in the University of Oxford, Blackstone was in 1758 appointed first Vinerian professor. The lectures which were the fruit of this appointment not only made him famous as an expositor of English law, but assured his success at the bar. Accordingly, in the following year, he returned to Westminster Hall and resumed practice, and, as the political doctrines which he taught as a lecturer had been such as to commend him to the notice of the Tory government of that day, he obtained its patronage and in 1761 was made King's counsel. In the same year he married Sarah, daughter of James Clitherow, of Boston House, Middlesex. Shortly afterward he was appointed principal of New Inn Hall, Oxford. Other honors followed fast, and he became successively member of Parliament (1768), bench of the Middle Temple, and solicitor-general to the Queen, and was offered the post of Chief Justice of the Court of Common Pleas in Ireland, which he declined. In 1765 Blackstone published the first volume of his lectures, and the remaining three volumes between that date and 1769. These lectures form his celebrated *Commentaries on the Laws of England*. His practice continuing to increase, he resigned his Oxford appointment in 1766. Four years later he was offered the Solicitor-Generalship, and after declining it was knighted and made a justice of the Court of King's Bench and a few months later of the Court of Common Pleas. The remaining years of his life were spent in the discharge of his duties as a judge, and, in conjunction with John Howard, in laboring for the reform of the inhuman prison system of his day. He died, Feb. 14, 1780, at the age of 57.

The fame of Blackstone rests mainly upon his *Commentaries*. His other legal works were relatively unimportant, and, though his merits as a judge were considerable, they were, perhaps, not such as, of themselves, to have made his reputation outlive him. As a commentator he had many excellences. His style was in general clear and gracefully ornate, and his illustrations pleasing and felicitous. So long as he confined himself to exposition—i.e. the accurate statement in scholarlike English of the doctrines of English law that had theretofore lain buried in the technical treatises of lawyers like Littleton and Coke—Blackstone was unsurpassed and rendered an important service to his country and the legal profession. But he was ambitious of

combining with this exposition the higher task of explaining the reasons for the law as well as its merits and defects. Unfortunately he had not the requisite qualifications for this wider survey of legal principles and institutions. His knowledge of English history was, as Hallam tells us, superficial, and his study of the philosophy of law had been imperfect. With the works of Montesquieu and Beccaria he was, indeed, acquainted, but the use which he makes of them shows only too clearly that he had not mastered them or fully imbibed their spirit. His political philosophy was, indeed, that of his time—a period of stagnation in the progressive evolution of political institutions. He had no more doubt than Edmund Burke of the divine origin of the British Constitution, and the rule of the people and their affairs by the “gentlemen of independent estates and fortune,” to whom his famous lectures were addressed, seemed to him the perfection of human government. His eloquent exposition of Tory principles subjected his work to attacks from various persons whom he describes as “zealots of all denominations, religious as well as civil,” including the author of the *Letters of Junius*.

As an institutional treatise, the *Commentaries* leaves much to be desired, the order and arrangement being unscientific and empirical. Notwithstanding its defects, the positive merits of the work—its systematic character, its comprehensiveness, the accuracy of its exposition, and the dignity and charm of its style—have made it the best-known and in many respects the most influential treatise in English law. All subsequent commentaries, including those of Broom, Stephen, and Kent, have been modeled upon it, and it continued to be for 100 years the foundation of all legal education in America.

Indeed, it would be difficult to exaggerate the influence of Blackstone's work on the bar or on the course of legal development in this country. Its success was instantaneous. Two years after the publication of the fourth and concluding volume of the work in England, it was republished in Philadelphia, and it is said that 2500 copies of the book were immediately absorbed in the Colonies before the outbreak of the Revolution. Edmund Burke, in a celebrated speech delivered in the House of Commons, in 1775, asserted that nearly as many copies of the *Commentaries* had been sold in the Colonies as in England. From its appearance it was the favorite, if not the only text-book of the American law student, and it came to be regarded by the courts, as well as the legal profession, not only as an indispensable means of acquiring a knowledge of the law, but as the final and authoritative statement of its rules and principles. A learned American commentator on Blackstone, the late William G. Hammond, declares that, “upon all questions of private law at least, this work stood for the law itself throughout the country and, at least for a generation to come, exercised an influence upon the jurisprudence of the new nation which no other work has since enjoyed and to which no other work can possibly now attain.” While the work has long since lost its unique position of a legal authority, its influence as an indispensable part of the education of the American lawyer has only recently begun to wane. It still forms a part of the regular work of instruction in many American law schools, while, of the multitude of young men and women who still come to the

bar without a law-school training, it is safe to say that a large majority read Blackstone, in whole or in part. Doubtless, it is to the long predominance of the Blackstonian tradition in this country, to its influence in forming the mind of the American lawyer, that we are largely indebted for the consistency and unity of our American common-law system.

Numerous editions of the *Commentaries* have been printed, the most important being those of Archbold, Chitty, and Christian in England and those of Cooley, Sharswood, Kerr, Hammond, and Lewis (Philadelphia, 1898) in the United States. As more than a century has elapsed since the *Commentaries* were composed, so many alterations and additions are requisite to adapt them to the existing state of the law that it may be said that their purpose has been served and that they are now valuable chiefly as materials for the history of the law.

In addition to the *Commentaries* Blackstone wrote several essays on legal topics which were collected and published under the title of *Law Tracts* (1750), besides political writings of some importance in their day, but not permanently enduring. He is also the editor of 20 volumes of reports of cases decided in the courts of King's Bench and Common Pleas, commencing with the term in which he was called to the bar and continuing with some intervals through the whole period of his life. The introduction to this work by James Clitherow, Blackstone's brother-in-law and executor, contained a biographical sketch which has formed the basis of all subsequent memoirs.

Consult also *The Law Magazine*, vol. xv (London, 1836), and *The Dictionary of National Biography*, vol. v (London, 1886).

BLACK STONE OF MEOCCA. A sacred stone in the Kaaba at Mecca, which was said to have been given by an angel to Abraham and to have been originally white, but blackened by the sins of mankind. The stone is probably a meteorite.

BLACKSTONE RIVER. A river of Massachusetts, rising near Worcester, flowing southeast through Rhode Island, and emptying into the Providence River, near Providence (Map: Massachusetts, D 3). In the upper part of its course the river flows through a series of small lakes and ponds. Below Pawtucket it is known as the Seekonk. It is the most important river of eastern New England south of the Merrimack and is noted for the amount of power it furnishes, there being along its banks a succession of mills. It is about 70 miles long and drains above Pawtucket an area of 458 square miles. It falls over 400 feet from Worcester to the sea.

BLACKTAIL. An American deer, notable for its black tail: (1) the mule deer (q.v.); (2) the Columbian deer (*Odocoileus columbianus*) of the coast region, from central California to Alaska. It is one-third smaller than the mule deer, but has similar antlers. In summer it is reddish, but in winter brownish gray, mottled with black, darkest along the spine. “Top of head chestnut and black; black stripe over the eyes, meeting on forehead; chin white, behind is a black patch; face gray; upper throat, posterior portion of under parts, and base of tail, white; rest of under parts mottled similarly to the back; chest sooty; legs dark cinnamon, inner side white; tail above black, . . . beneath, white” (Elliot). Alaskan specimens are paler. This deer exists only between the moun-

tains and the coast and frequents the forested foothills and valleys covered with chaparral, where it is tolerably abundant. Its habits are similar to those of the mule deer. Consult Farrell, in Shields's *Big Game of North America* (Chicago, 1890), Van Dyke, in *The Deer Family* (New York, 1902), and the authorities referred to under DEER. For illustration, see Plate of DEER OF NORTH AMERICA.

BLACK TIN. A name applied to tin ore ready for smelting. See TIN.

BLACK-VAR/NISH TREE See MELANORRHEA.

BLACK VOMIT. The dark matter vomited in yellow fever, usually a sign of fatal termination of the disease. It is in part coagulated blood. The fever itself is sometimes called the "black vomit." See YELLOW FEVER.

BLACK WAD. Native black *pyrolusite* or *wad*. It is often synonymous with graphite.

BLACKWALL. Part of Greater London. For Blackwall Tunnel, see LONDON.

BLACK WALNUT. See WALNUT.

BLACK WARRIOR. (from the Choctaw name *Tuscaloossee*) (Map Alabama, B 2). A river of Alabama, formed by the junction of several large streams in Walker County. Sipsey Fork, coming in from the northwest, and Mulberry and Locust forks, from the northeast. It flows southwest, joining the Tombigbee River near Demopolis in the west-central part of the State. It is navigable to Tuscaloosa, above which city it has a considerable fall and furnishes extensive water power.

BLACK WARRIOR, THE. An American merchant vessel which, touching at Havana in February, 1854, on its way from Mobile to New York, was seized by the Cuban officials for violating the customs regulations of that port. Her cargo was confiscated, and her captain heavily fined, in spite of the protests of the American consul. The affair caused great excitement in the United States, especially in the South, and was the subject of a spirited correspondence between the American and Spanish governments. Had it not been for the strong feeling aroused throughout the North at that time by the debates over the Kansas-Nebraska Bill (qv), it is possible that the slave power, desirous of obtaining Cuba, would have succeeded in forcing the administration to use this as a pretext for a war of conquest against Spain. Spain finally restored the confiscated cargo and remitted the captain's fine. For a good account of the negotiations over the *Black Warrior* incident, consult Rhodes, *History of the United States from the Compromise of 1850*, vol. II (New York, 1893). Consult also, James, "The *Black Warrior* Affair," in the *American Historical Review*, vol. 12 (Lancaster, Pa., 1906), and, for much material on the incident, House Document No. 86, *Case of the Black Warrior and Other Violations of the Rights of American Citizens by Spanish Authorities* (Washington, 1854).

BLACK WATCH. A famous Highland regiment in the British army. In 1688 the Earl of Athole was commissioned to organize a guard for the maintenance of peace in the Highlands. They were known as the *Feroceadan Dubh* and wore a dark colored tartan, which distinguished them from the *Saghdlean Dearg*, or "red soldiers," as the regular troops were called. The different companies were engaged in the military police work, for which they were formed,

until 1740, in which year they were regularly organized into the Forty-second Regiment of the Line. Their war history begins at Fontenoy, and few regiments in the British service excel them in the number and character of their battle honors. But, it is interesting to note, service in the Black Watch was not always esteemed, particularly in the earlier days, for in 1743 a large portion of the regiment mutinied and fled to the north, only to be surrounded and forced to surrender, the ringleaders being put to death. Consult Burton, *The Black Watch* (London, 1910). See HIGHLANDERS.

BLACK WATER. See TEXAS FEVER.

BLACKWATER. The name of several rivers and streams in Great Britain and Ireland. The most important are 1 The Blackwater of Cork County, which rises in the west of Kerry County, flows past Millstreet, Mallow, Fermoy, Lismore, and Cappoquin, and enters the sea at Youghal harbor (Map Ireland, C 4). It has a course of 100 miles, is the seventh in size of the Irish rivers, abounds in salmon, and is navigable for barges for the last 15 miles of its course to Mallow. 2 The Blackwater of Ulster, 50 miles long, which rises on the confines of Tyrone and Fermanagh counties, runs past Caledon and Chalemont, and falls into the southwest corner of Lough Neagh. 3 The Blackwater of Essex, England, 40 miles long, which rises in the northwest of the county, flows past Coggeshall to Maldon, where it becomes an estuary opening into the North Sea. 4 The Blackwater, an affluent of the Boyne River in Navan County, Ireland, 40 miles long.

BLACKWATER STATE. Nebraska. See STATES, POPULAR NAMES OF.

BLACKWELL. A city in Kay Co., Okla., 111 miles north of Oklahoma City, on the Chickasaw River, and on the Atchison, Topeka, and Santa Fe, and the Frisco Lines railroads (Map Oklahoma, D 2). It is the seat of the Oklahoma State College (Baptist) and has several parks. There are glass, brick, and clay works, and flour mills, extensive deposits of natural gas are found in the vicinity. Pop., 1890, 2283, 1900, 2644, 1910, 3266.

BLACKWELL, ALICE STONE (1857-) An American reformer, niece of Elizabeth Blackwell. She was born in East Orange, N. J., graduated in 1881 at Boston University, of which she became a trustee, and aided her father and mother in editing *The Woman's Journal*. In 1885-1905 she also edited a paper called *The Woman's Column*. Devoting her main energies to the cause of woman's suffrage, she was made chairman of the literature committee of the National American Woman Suffrage Association and became a contributor to its *Political Equality* series. She also labored for the Armenians and other oppressed peoples. Besides many articles in periodicals, she wrote *Armenian Poems* (1896), *Songs of Russia* (1906), and *Songs of Grief and Joy* (1907), translated from the Yiddish of Ezekiel Leavitt.

BLACKWELL, ANTOINETTE LOUISA BROWN (1825-) An American minister and author, born at Henrietta, N. Y., and educated at Oberlin College, Ohio. In 1853 she was ordained pastor of the Congregational Church at South Butler, N. Y., and discharged her parochial duties for two years, when ill health compelled her to resign. Afterward she devoted herself to the exposition of philosophical views in literary form. Later she became a Unitarian.

and a leader in the woman suffrage movement. Her principal works are: *Studies in General Science* (1869); *The Seas throughout Nature* (1875); *The Physical Basis of Immortality* (1876); *The Philosophy of Individuality* (1893); *Sea Drift, or Tribute to the Ocean* (1903).

BLACKWELL, ELIZABETH (1821-1910). The first woman who ever obtained a medical diploma in the United States. She was born in Bristol, England. Circumstances induced the family to emigrate to New York, and they afterward went to Cincinnati. Miss Blackwell in 1838, with two elder sisters, opened a boarding school, which soon had a large attendance. She, however, chafed at the limitations which society had imposed on women. At length, in 1844, the school was given up, Miss Blackwell determining to become the medical apostle of her sex. After three years' further work as a teacher, during which time she devoted the whole of her leisure to the study of medical and anatomical books, she went to Philadelphia, where she applied in vain for admission into the medical schools. Failing in this, she entered on a course of private anatomical study and dissection and of midwifery, with Professor Allen and Dr. Warrington of Philadelphia. After strenuous efforts she at last obtained admission to Geneva Medical College, Geneva, N. Y., in 1847, graduating with the highest honor in 1849. During the two years of her study she conducted herself with a propriety and discretion that gained for her the esteem and respect of all her fellow students. Shortly after her graduation she visited Europe in order to prosecute further her medical studies. In Paris she was told that it would be impossible for her to gain entrance to the schools or hospitals there unless she adopted male attire—a suggestion repugnant to her taste and to the great object she had in view, i.e., the recognition of female physicians. After much perseverance she was at length admitted into the Maternité and was permitted to visit other hospitals. After studying at St. Bartholomew's Hospital, and the Woman's Hospital, London, she returned to New York in 1851 and there established herself in practice. In 1852 she delivered a series of lectures to women, on health and physical development, and published a work entitled *The Laws of Life, Considered with Reference to the Physical Education of Girls*; and in 1853 established the New York Infirmary for Women and Children, which proved so successful that she was induced in cooperation with her sister Emily, to found, in 1868, The Woman's Medical College of the New York Infirmary. In 1868 she settled in London and became connected with the Women's Medical College there. Her published works include: *Counsels of Parents on the Moral Education of their Children in Relation to Sex* (1879); *Corruptions of Neo-Malthusianism: the Influence of Women in the Medical Profession* (1890); *Pioneer Work in Opening the Medical Profession to Women* (1895). Consult Vaughan, "The Early Days of Elizabeth Blackwell," in *Fortnightly Review*, N. S., vol. xciv (London, 1913).

BLACKWELL, EMILY (1826-1910). An American physician, born at Bristol, England. When she had earned enough money to enable her to study medicine, she applied for, but was refused, admission at the Geneva Medical School, at which her sister Elizabeth (q.v.) had been allowed to study. After being refused at 10

other schools she finally obtained admission to the free hospital of Bellevue in New York City, and after an interval was received by the Western Reserve University, where she finished her course. After studying at Edinburgh and under some of the greatest surgeons of Paris, she became associated with her sister in the foundation of hospitals and dispensaries, and the chief professional events of their lives they shared.

BLACKWELL, GEORGE LINCOLN (1861-). An American Bishop of the African Methodist Episcopal Zion church. He was born in Henderson, N. C., of slave parents, graduated in 1888 from Livingstone College, Salisbury, N. C., and in 1892 from the School of Theology of Boston University. He had entered the ministry of the African Methodist Episcopal Zion church when 20 years old; in 1893-06 he was dean of its theological school at Livingstone College, and in succession was general agent of the denominational publishing house and editor of its Sunday-school literature (1896-1900), its general secretary (1900-04), and its general secretary and missionary secretary (1904-08). In 1908 he was consecrated a Bishop of his church, which he represented as delegate in the ecumenical councils at London (1901) and at Toronto (1911). He wrote *The Model Homestead* (1893), *Cloaks for Sin* (1904), and *A Man Wanted* (1907).

BLACKWELL, THOMAS (1701-57). A classical scholar of some eminence, born in Aberdeen, Aug. 4, 1701, he studied Greek and philosophy in Marischal College and took the degree of M.A. in 1718. In December, 1723, he was appointed professor of Greek in Marischal College and in 1737 published anonymously at London an *Inquiry into the Life and Writings of Homer* (2d ed., 1748), and, in 1747, *Proofs of the Inquiry into Homer's Life and Writings*. In 1748 he published, also anonymously, *Letters Concerning Mythology*. The same year he was made principal of Marischal College; and at the commencement of the session of 1752, on his recommendation, a new order in teaching the sciences was introduced into the college. In 1753 he published the first volume of his *Memoirs of the Court of Augustus*. The second volume appeared in 1755, and the third, left unfinished by him, was completed by John Mills in 1704. His works show wide reading, but are marked by lack of method and order. He died March 8, 1757.

BLACKWELL'S ISLAND. A narrow, rocky island in the East River, forming part of New York City, between Manhattan Island and Long Island, about 1½ miles long by one-eighth of a mile wide (Map: New York City, E 4). It is used exclusively for the penal institutions and hospitals under charge of the city of New York. See NEW YORK CITY.

BLACKWOOD. See ACACIA; KINGWOOD.

BLACKWOOD, FREDERICK TEMPLE HAMILTON-TEMPLE (1826-1902). See DUFFIERIN AND AVA, MARQUIS OF.

BLACKWOOD, WILLIAM (1776-1834). A distinguished Edinburgh publisher, the originator of *Blackwood's Magazine*. He was born in Edinburgh, Nov. 20, 1776. After serving his apprenticeship to the bookselling business in his native city, and prosecuting his calling in Glasgow and London, he settled in Edinburgh as a bookseller—principally of old books—in 1804. On April 1, 1817, at which time he had become a publisher on his own account, he issued the

first number of *Blackwood's Magazine*. The literary ability displayed in this periodical was so much in advance of the monthly magazines then existing that, after a little disappointment at first, it soon became a great success. Its remarkable popularity was sustained by the papers of John Wilson, J. G. Lockhart, James Hogg, and other writers, whom Blackwood had the liberality and tact to attract to his standard. Overwhelming its political and literary opponents, now with the most farcical humor, and now with the bitterest sarcasm—sometimes with reckless injustice—the magazine secured for itself a prodigious reputation, more particularly among the Tories, of whose political creed it has always been a resolute adherent. William Blackwood conducted the magazine until his death, Sept. 16, 1834. The publishing business has been greatly extended by the descendants of the founder. Consult *William Blackwood and His Sons* (Edinburgh, 1897-98), the first two volumes of which are by Mrs. Oliphant, the third, dealing with John Blackwood, by his daughter, Mrs. Gerald Porter.

BLACKWOOD RIVER. A river in West Australia, which enters Flinders Bay, just east of Cape Leeuwin, in lat 34° 14' S and long 115° 12' E (Map Australia, B 5). It flows through the counties of Durham and Nelson, first to the west and then to the south, traversing a district of wood and pasture. It is navigable for boats to a distance of 25 miles from the sea.

BLACKWOOD'S MAGAZINE. A famous magazine founded by the Edinburgh publisher, William Blackwood, in 1817, subsequently conducted by his son, John Blackwood, and still one of the important English periodicals in literature, philosophy, and politics.

BLADDER, URINARY (probably akin to the verb *to blow*). The membranous sac which receives the urine in man and animals after it is secreted by the kidneys. The bladder wall consists of three coats—a lining mucous membrane, a middle muscular coat, and an outer coat which is serous where the organ is covered over by peritoneum, and fibrous throughout the rest of its extent. The mucous membrane of the bladder is lined with stratified squamous epithelium (see EPITHELIUM) and contains small racemose glands (see GLAND) and lymph nodules. The muscle of the middle coat is of the involuntary type and consists of inner and outer layers which are longitudinal and of a middle circular layer. The serous coat consists of a connective-tissue layer covered by a layer of flat endothelial cells. Where the serous coat is wanting, a fibrous layer covers the muscular coat and blends with the surrounding connective tissue.

The average capacity of the bladder is one pint. Its shape is somewhat conical, the apex being upward, and the anterior part of the base constricted at the commencement of the urethra, forming the neck of the bladder. On each side, rather below its middle, open the ducts from the kidneys (the ureters), an imaginary line drawn between them, and from each end of this line others drawn to the neck of the bladder, form an equilateral triangle. In this space, which is called the *trigone*, the mucous membrane is not thrown into folds, but is smooth and very sensitive, the slightest pressure upon it gives rise to a desire for micturition. The bladder is situated in the pelvis, in adults, be-

hind the pubes, in front of the rectum in the male and the uterus in the female, but much higher in the young. It is kept in position by four true or membranous ligaments, and false ligaments formed of folds of the peritoneum. In the male in front of the neck of the bladder lies the prostate gland, surrounding the first part of the urethra (qv). Like all cavities lined by mucous membrane, the bladder is subject to catarrhal inflammation, accompanied by an increased secretion of mucus, with fermentation, rendering the urine turbid, causing a frequent and painful desire to micturate, and constitutional disturbances. The symptoms may be relieved by hot applications, together with opiates, internal antiseptics, and diuretics. If there is much mucus or blood or decomposed urine in the bladder it may be washed out with a solution of boric acid, or other mild antiseptic. If there is any known cause for this inflammation, as a stone, it must be removed.

Some persons are troubled with a frequent desire to pass water, and many persons with chronic cystitis never effectually empty their bladders, always leaving a portion of "residual urine" which keeps up the irritation. See CYSTITIS.

Paralysis of the bladder may be the result of accident, or disease of the nervous centres, or overdistention. In this condition the urine accumulates and dribbles away and must be drawn off by the catheter (qv). This dribbling, or *incontinence*, is to be distinguished from irritable bladder, as it is often the sign of a distended bladder. Retention of the urine may be caused by mechanical obstacles to its exit, such as a hypertrophied prostate gland, by paralysis, or by an absence of volitional power over the muscles. This last is termed *hysterical retention*, and is common in young girls, in persons suffering from seasickness, from nostalgia. Retention also results occasionally from operation or from accident, such as a broken leg, etc. Any long-continued inflammation or obstructive difficulty is usually followed by a thickening of the walls of the bladder itself, or *hypertrophy*. The mucous membrane may form pouches in these thickened walls—a condition which is called *sacculated bladder*. The organ is also liable to be attacked by various tumors and tubercles.

The bladder may be ruptured by accident from without, as, for instance, by a blow. This accident is usually fatal if prompt surgical aid is not secured.

BLADDER CAMPION. See SILENE.

BLAD'DERNUT' (for derivation see below), *Staphylea*. A genus of plants, the type of a small family, Staphyleaceae. Only about 11 species are known, which are found in very different climates and scattered over the world. They are mostly small trees of rather elegant appearance. The seeds contain a considerable quantity of a fixed oil, which is slightly purgative. The common bladder-nut (*Staphylea trifolia*) is a native of the east of Europe and of temperate parts of Asia, which has been admitted into the British flora, but was in all probability introduced as an ornamental tree. It is frequently planted in shrubberies, as is also *Staphylea trifolia*, a North American species with ternate leaves. The wood of both is firm and white, well suited for the purposes of the turner. The seeds may be eaten, but act as a mild aperient. The flower buds are pickled as

capers. The name "bladdernut" has reference to the curious inflated membranous capsule and the hard, bony "testa" of the seed. The name "Staphylea" is from the Gk. *σταφύλη*, *staphylē*, a bunch of grapes, and has reference to the racemed flowers. See Plate of *BIGNONIA*, ETC.

BLADDERWORM. An encysted larval tapeworm. See HYDATID; TAPEWORM.

BLADDERWORT (so named from the little bladders on the leaves which float the plant at the time of flowering), *Utricularia*. A genus of plants of the family Lentibulariaceae, containing about 75 species, the bright blossoms of which, along with those of water lilies, etc., adorn the surface of lakes, ditches, and marshes in almost all parts of the world. In the United States are found a dozen or more species with yellow, violet, or purple flowers. Great Britain has only three species, all of which have yellow flowers. These plants are very interesting from the provision made for the expansion of their flowers above water, although the whole plant is ordinarily submerged. The stems and leaves are furnished with numerous little bladders, which are filled with water till the time of flowering, when they become filled with air, and this, again, gives place to water after flowering is over, so that the seeds are ripened at the bottom. The bladders have an orifice guarded by bristles and other armature. Aquatic insects sometimes enter them, are imprisoned, and the plant utilizes the products arising from their decay. See Plate of *BIGNONIA*, and cut ("a") in **CARNIVOROUS PLANTS**.

BLADENSBURG. A town in Prince George Co., Md., 6 miles northeast of Washington (Map: Maryland, K 5). Here, on Aug. 24, 1814, a British force of 6000 men, under General Ross and Admiral Cockburn, with a loss of about 500, defeated 7000 Americans under General Winder. The British then entered Washington without further hindrance. Bladensburg was formerly a noted dueling ground; and here, in 1820, Commodore Decatur was mortally wounded by Commodore Barron. Pop., 1890, 503; 1900, 463; 1910, 400. Consult articles on the battle and on the Bladensburg dueling grounds in the *Magazine of American History*, vols. xv and xxv (New York, 1877-93).

BLAENAVON, blā-nā'von (Cymr., Celt. *blaene*, source + *avon*, river). A coal-mining town and railway junction in Monmouthshire, England, on the Avon, $4\frac{1}{2}$ miles southwest of Abergavenny (Map: England, C 5). There are iron and steel works, rolling mills, and blast furnaces in the vicinity. Pop., 1891, 11,400; 1901, 10,900; 1911, 12,010.

BLAEU, blou, **BLAEUW**, or **BLAUW**. A family of learned Dutch publishers. The founder of the firm was Willem Janszoon Blaeu (1571-1638), a mathematician, born at Alkmaar, Holland. He was a pupil in astronomy of Tycho Brahe and secured a considerable reputation by publishing terrestrial and celestial globes, excelling in beauty and accuracy everything that had preceded them. The *Novus Atlas* (6 vols., 1634-62) is his principal work. His sons, Cornelius (died 1650) and Joan (died 1673), carried on his business together until the death of Cornelius. Their *Atlas Major* (11 vols., 1662) is a splendid work, and the maps are valuable from the light they throw on local history. Two of Joan's sons carried on their father's business until about 1700. Some of their classical publications, especially *Cicero's Orations* (1690), are

still highly prized. Consult Baudet, *Leven en werken van Willem J. Blaeu* (Utrecht, 1871).

BLAGOVIESHTCHENSK, blā'go-vyeshl'-chēnsk (Russ. City of the Annunciation) Capital of the governor-generalship of the Amur, on the left bank of the Amur, at its junction with the Seya, on the Manchurian frontier (Map: Asia, M 3). It is one of the most prosperous towns in east Siberia, due chiefly to the gold mines in the vicinity. There are iron foundries and flour mills and an active trade in tea, grain, and cattle is carried on. Only a military outpost in 1856, Blagovieshtchensk became in 1858 the capital of the Amur region. In 1868 it had 3344 inhabitants; in 1880, 20,212, and in 1904, 40,399 inhabitants. In July, 1900, the Chinese made a feeble attack upon it, and this led to a general massacre of the peaceful Chinese residents of the city and environs. The Russian authorities ordered them to pass over the Amur into Chinese territory without providing boats. From 10,000 to 15,000 perished by drowning.

BLAINE. See NANTYGO and BLAINE.

BLAINE, JAMES GILLESPIE (1830-93). One of the most brilliant, resourceful, and popular of American party leaders. He was born, of Scotch-Irish parentage, at Brownsville, Pa., on Jan. 31, 1830, and graduated in 1847 at Washington College in his native State. He began his career as a teacher in the Western Military Institute, Georgetown, Ky. (1848-51), and in the Pennsylvania Institute for the Blind, Philadelphia (1852-54), when he removed to Augusta, Me., where he became one of the editors of the *Kennebec Journal* (1854-57). In 1857-60 he undertook the editorship of the *Portland Advertiser*, an influential daily newspaper. The prominence which he soon acquired led to his election to the State Legislature as a Republican. He served from 1859 to 1862 in the Lower House of that body, was Speaker in 1861 and 1862, and in 1859-81 was chairman of the Republican State Committee. Rising rapidly to a commanding place, he was elected in 1862 to the House of Representatives, where he served until 1877 and distinguished himself both as an eloquent debater and as a master of parliamentary law. He was Speaker of the House in 1869-75. He vigorously supported the administration of President Lincoln during the Civil War, opposed the "greenback" movement of 1867-68, and later he succeeded in modifying some of the most radical measures proposed by Thaddeus Stevens at the time of reconstruction. (See **RECONSTRUCTION**; **STEVENS**, **THADDEUS**.) While Speaker he was most successful, showing readiness and nerve, and also personal courtesy to his opponents both within and without the Republican party. The only exception to this statement is to be found in his withering retort to Roscoe Conkling, whom he likened to a turkey gobbler, thereby incurring an enmity which in after years helped to mar his own political ambitions. (See **CONKLING**, **ROSCOE**.)

So pronounced a personality as Mr. Blaine's very naturally led to many controversies that were acute and of which the effects were seen when, in 1875, the Democrats gained control of the House for the first time since the close of the Civil War. A measure to grant complete amnesty to all ex-Confederates was opposed most vehemently by Mr. Blaine, who in a series of passionate and able declamations sought to strike from the list of those to whom this amnesty was to be granted the name of Jefferson

Davis In the course of this debate Blaine showed remarkable power in reviving the smoldering resentments that dated from the days of the war, and he provoked the Southern leaders to utterances which gave Blaine a chance to fan the embers of sectional hatred into a fierce flame. On June 5, 1876, not long before the National Republican Convention was to nominate a candidate for the presidency, there occurred the highly dramatic incident which has to do with what are known in American political history as the "Mulligan Letters" (qv). On this occasion Mr. Blaine, after denying the right of the House to compel him to produce his private correspondence, did nevertheless, after a brief pause, produce a packet of letters and, saying that he invited "the confidence of forty-four millions of his countrymen," read them one by one, making comments on them and explanations of them. In the brief debate which followed Mr. Blaine completely routed his adversaries, and an adjournment of the House was taken amid a scene resembling pandemonium. Mr. Blaine had won a brilliant triumph for the moment and had apparently made of his enemies his footstool. Such, however, was not the unanimous opinion even of his own party. The letters written to James Mulligan and to Warren Fisher showed that the writer of them had at the time (to use his own words) been "crippled and deranged" in his finances, and that he had sought pecuniary assistance because of his own influence as a member of the House of Representatives. One of them ended with the significant words, "Burn this letter." It was also made clear by a letter dated Oct. 4, 1869, that Blaine, while Speaker, had helped to thwart a measure which would have been unfavorable to his own financial associates. Therefore, when the Republican Convention met, although Blaine on the seventh ballot received 351 votes, a combination of all his opponents upon Rutherford B. Hayes, of Ohio, effected Blaine's defeat and made Hayes the Republican candidate against that very able Democratic statesman, Samuel J. Tilden, of New York. The result of the election was disputed, and an Electoral Commission (qv), created by Congress to canvass the returns, seated Mr. Hayes with a majority of only one electoral vote.

Though he did not secure the nomination, "The Plumed Knight," as Col. Robert Ingersoll had styled him in his nominating speech, was elected, in the same year, to the United States Senate. As a Senator, he opposed the Bland Silver Coinage Act (see Bimetallism), supported ship subsidies, spoke and voted against the unrestricted immigration of the Chinese, and strongly favored a high protective tariff and a subsidy for various American industries. In spite of his defeat in 1876 he was still the unquestioned leader of his party, so that in 1880 he was once more a candidate in the Republican Convention in opposition to Grant. The Convention, after taking 36 ballots, gave the nomination to a "dark horse" in the person of James A. Garfield, of Ohio, upon whom the adherents both of Blaine and of John Sherman united. Garfield defeated Gen. W. S. Hancock in the ensuing election and in March, 1881, appointed Blaine to be Secretary of State, an office which he held for only eight months. After the death of President Garfield the presidency devolved upon Vice-President Arthur, then a close friend of

Conkling, who, as already stated was inimical to Blaine. During these eight months as Secretary of State, Blaine attempted to bring about a modification of the Clayton-Bulwer Treaty, advocated a Pan-American Congress, and also aroused criticism by his determination to prevent the transfer of territory from Peru to Chili. This was charged to be due to his alleged interest in the so-called Shepherd claims (qv), but public opinion did not sustain this assertion. His resignation was inevitable, and he now found himself relegated to private life for the first time in very many years. He turned his attention to the preparation of a work entitled *Twenty Years of Congress*, of which the first volume appeared in 1884 and had a favorable reception.

In this same year, however, he was once more a candidate for the presidential nomination, and this time successfully. Nevertheless, the opposition to him within his own party was very bitter, so much so that large numbers of independent Republicans, who were popularly known as "Mugwumps" (qv), voted against him, especially in New York, Connecticut, and Massachusetts, and cast their ballots for the Democratic candidate, Grover Cleveland, of New York, who had been elected Governor of that State by the enormous plurality of 192,000 votes two years before. The political campaign of 1884 was unparalleled in American political history for the malignity with which both candidates were assailed and for the outrageous indecency of the stories that were circulated concerning their private lives. (See CLEVELAND, GROVER.) Blaine made extensive tours throughout the country, during which he showed all of his characteristic adroitness and fervid eloquence, but the issues by which he hoped to win had ceased to interest the country. Sectional animosity was dying out. People were tired of what was known as "waving the bloody shirt," and the Democratic platform had been so ably drawn as to subordinate the tariff question. The result, therefore, turned chiefly upon the respective merits of the two candidates, and here Cleveland was held to be superior to Blaine in political integrity and civic virtue. Various reasons have been assigned for the defeat of Blaine, but they may be probably summed up as resulting, first, from the hostility of Mr. Conkling and his adherents, second, from the defection of the independent Republicans, and third, from the fact that, although Mr. Blaine was himself friendly to the Catholic voters, and though his own sister was the Mother Superior of a convent, he had allowed the Rev. Samuel D. Burchard (qv), the spokesman of a number of Protestant clergymen, to style the Democratic party (October 29, 1884) "the party of Rum, Romanism, and Rebellion." This inadvertence of Blaine was accounted for by the fact that he did not notice the famous phrase and took "Romanism" for Mormonism.

Betaking himself once more to literary labor, he completed the second volume of his *Twenty Years of Congress* (1886) and also wrote a volume called *Political Discussions* (1887). He also visited Europe and was in Florence at the time when the Republican Convention met in 1888. Blaine's name was again mooted as that of a candidate, but it was withdrawn at his own request, and his adherents secured the nomination of Benjamin Harrison, of Indiana, who was elected. President Harrison appointed

Blaine Secretary of State, in which office he served until 1892. As Secretary of State he secured a favorable treaty with Germany concerning the Samoan Islands (q.v.); assembled and presided over the first Pan-American Conference (q.v.); and engaged in a controversy with Lord Salisbury over the Bering Sea fisheries (see **BERING SEA CONTROVERSY**); compelled the Chilean government to admit the inviolability of the American legation at Santiago, to dismiss its Foreign Secretary for having made public a letter which spoke of President Harrison and Secretary Blaine in terms of insult, and to pay an indemnity to the families of certain American sailors who had been wantonly killed by a mob in the streets of Valparaiso; and took a firm stand in the matter of the lynching at New Orleans of the 11 Italians accused of assassinating the chief of the police of that city.

In 1892 Blaine's relations with the President became difficult, owing, it is said, to a falling out between Mrs. Harrison and Mrs. Blaine. In June, just before the Republican Convention was held at Minneapolis, he resigned from the cabinet, and his name was unsuccessfully presented to the convention which renominated Harrison. Blaine had, in fact, become broken down in health. He retired to his home in Maine and there died on Jan. 27, 1893.

Bibliography. There exists as yet no adequate account of the life and political services of Mr. Blaine. The standard biography at the present time is that written by Stanwood (Boston, 1905), but Mr. Stanwood's close relationship to the Blaine family made it impossible for him to write of his subject with a spirit of historical detachment. The reader is, however, referred to his *History of the Presidency* (Boston, 1898) for much valuable information, and also to Mr. Blaine's own books already cited. *The Biography of James G. Blaine* (Norwich, 1895), by Mary Abigail Dodge ("Gail Hamilton"), contains many interesting facts, but is in the nature of a panegyric rather than of a critical biography. Reference may be made to: Conwell, *The Life and Public Service of James G. Blaine* (Muskegon, 1884); Crawford, *James G. Blaine* (Philadelphia, 1893); Ridpath, *The Life and Work of James G. Blaine* (New York, 1893); Brooks, *Statesmen* (New York, 1893); Varigny, *Les Etats-Unis* (Paris, 1892); *The Letters of Mrs. James G. Blaine*, ed. by Beale (2 vols., New York, 1908); an article in *McClure's Magazine*, vol. xiv (1900); Harry Thurston Peck, *Twenty Years of the Republic*, especially chaps. i, v, and vi (New York, 1906; last reprint, 1913); id., *American Party Leaders*, chap. v (New York, 1914).

BLAINVILLE, blān'vél', HENRI MARIE DUCROTAY DE. See DUCROTAY DE BLAINVILLE.

BLAIR. A city and the county seat of Washington Co., Neb., 25 miles north by west of Omaha, on the Chicago and Northwestern, and the Chicago, St. Paul, Minneapolis, and Omaha railroads (Map: Nebraska, H 3). It contains Dana College and the Crowell Memorial Home for retired Methodist ministers. The city has canning, horse-collar, and cider, vinegar, and pickle factories, and a proprietary establishment. The water works are owned by the city. Blair adopted the commission form of government in May, 1914. Pop., 1900, 2970; 1910, 2584.

BLAIRE, ANDREW ALEXANDER (1848-).

An American chemist, born in Woodford Co., Ky. He graduated at the United States Naval Academy (1866) and became an ensign in the navy, but afterward devoted himself to analytical chemistry, especially analysis of iron and its ores. From 1875 to 1878 he was employed in testing iron and steel for the United States government at the Watertown Arsenal, and from 1879 to 1881 acted as chief chemist to the United States Geological Survey and the Tenth Census. At the termination of this engagement he devoted himself to the practice and improvement of the methods of technical analysis. Besides a number of original papers and reports on various special subjects of metallurgy, he wrote *The Chemical Analysis of Iron* (1888; 7th ed., 1912).

BLAIR, FRANCIS PRESTON (1791-1876). An American journalist and politician, born in Abingdon, Va. He graduated at Transylvania University, Ky., in 1811 and soon afterward became prominent in State politics. He strongly supported Henry Clay for the presidency in 1824, but in 1828 became an enthusiastic adherent of Andrew Jackson. In 1830 he went to Washington, on Jackson's invitation, to assume the editorship of the *Globe*, which was the official organ of the Democratic party until 1845, when President Polk forced Blair's resignation. Blair supported Van Buren in 1848 and Pierce in 1852, but afterward joined the newly organized Republican party, and in 1856 presided over the Pittsburgh Convention. In 1860 he was an active supporter of Abraham Lincoln. In December, 1864, he made an unofficial visit to Richmond and proposed to Jefferson Davis and others who were influential in the Confederate government the arrangement of a peace on the basis of a joint campaign by the Northern and Southern armies against Maximilian in Mexico. This proposal, though wholly unofficial, led to the famous peace conference of Feb. 3, 1866, at Hampton Roads, between President Lincoln and the Confederate representatives, Stephens, Hunter, and Campbell.

BLAIR, FRANCIS PRESTON, JR. (1821-75). An American lawyer, politician, and soldier, born in Lexington, Ky. He graduated at Princeton in 1841, was admitted to the bar in 1842, and removed to St. Louis to practice law. In the Mexican War he served in the United States army as a private. Afterward he was editor for a time of the *Missouri Democrat*, became prominent in State politics, was a member of the Missouri Legislature from 1852 to 1856, and after 1856 served for several years in Congress as a Republican. At the outbreak of the Civil War he was the leader of the Union party in Missouri, and by his energy, tact, and political sagacity was largely instrumental in preventing that State from joining the Confederacy. In April, 1861, he entered the Federal army as a colonel, and before the close of the following year had risen successively to the rank of brigadier general (1862) and of major general (1862). He led a division under Sherman at Vicksburg in 1862-63, commanding the assault upon Chickasaw Bluffs (Dec. 26, 1862), and in 1864 took a prominent part, as division commander and temporarily as commander of the Seventeenth Corps, in the famous march to the sea. He was nominated as Collector at St. Louis and as Minister to Austria by President Johnson in 1866, but, owing to his views on reconstruction, the Senate refused to confirm.

either appointment. Afterward he joined the Democratic party, was its candidate for Vice President in 1868, and from 1871 to 1873 was a member of the United States Senate. He published *The Life and Public Services of Gen. William O. Butler* (1848) and *Colonization and Commerce* (1859).

BLAIR, HENRY WILLIAM (1834-) An American politician and lawyer, born in Hampton, N. H. He received an academic education, was admitted to the bar in 1859, and was prosecuting attorney for Grafton County in 1860. During the war he was lieutenant colonel of the Fifteenth New Hampshire Volunteers. He was a member of the New Hampshire House of Representatives in 1866, of the State Senate, from 1867 to 1868, and Republican Representative in the Forty-fourth and Forty-fifth Congresses. From 1879 to 1891 he was United States Senator. He was appointed Minister to China in 1891, but that government declined to receive him owing to the language used by him in various speeches against the Chinese. He gained considerable reputation as a reformer by his bill to prohibit the sale and manufacture of liquors and his measures to promote public education.

BLAIR, HUGH (1718-1800) A Scottish divine and man of letters. Born in Edinburgh, April 7, 1718, he was educated at the university of his native city, where he attracted the attention of his instructors by an *Essay on the Beautiful*. In October, 1741, he was licensed to preach by the presbytery of Edinburgh, and after occupying the churches of Colleslie in Fifeshire, Canongate Church in Edinburgh, and Lady Yester's, he was promoted in 1758 to the highest position attainable by a Scotch clergyman—one of the charges of the High Church, Edinburgh. His discourses, which display little power or originality of thought, were yet greatly admired on account of their polished style. In 1759 Blair commenced a series of lectures on composition at the university, and three years afterward, a new chair of rhetoric and belles-lettres, with a salary of £70 a year, being created by the crown, Blair was made professor. He held this appointment until 1783, when he resigned, and in the same year published his *Lectures*, which obtained a reputation that time has ultimately sanctioned. His first volume of sermons, which appeared in 1777, proved a great success. George III. showed his appreciation of them by bestowing on Blair, in 1780, a pension of £200 a year. These sermons are now considered as moral essays rather than sermons. Blair's critical acumen was not great, since he strenuously defended the authenticity of Ossian's poems. He died Dec. 27, 1800. For his life, consult Finlayson (London, 1801) and Hill (Edinburgh, 1807).

BLAIR, JAMES (1656-1743) A colonial clergyman and educator, the founder and first president of the College of William and Mary in Virginia. He was born in Scotland, graduated at the University of Edinburgh in 1673, removed to England in 1682, and in 1685 was sent to Virginia as a missionary of the Church of England. He was minister successively at Henrico City, Jamestown, and Williamsburg, and after 1689 was Commissary of Virginia. In this capacity he did much to raise the character of the provincial clergy and to rectify many clerical abuses. In 1690, at a time when there was only "one privately endowed school

and a few old field schools' in the Colony, he took up the work of founding a college in Virginia, and in the same year began soliciting subscriptions for an institution which was to provide for "the Education of our Youth, a constant supply of our Ministry, and perhaps a foundation for ye Conversion of our neighboring Heathen to the Christian Faith." In 1691 he went to England and there, in 1693, secured a charter for the College of William and Mary. On his return he worked indefatigably to secure the immediate election of buildings, and until his death was president of the college. After 1693 Blair was also a member of the Council of Virginia, of which he was for some time President. In this capacity he was instrumental in securing the removal of three governors in turn. It has been said of Blair that he did more than any other one man for the intellectual advancement of Virginia during the Colonial period. He collaborated with Henry Hartwell and Edward Chilton in the preparation of a valuable work entitled *The Present State of Virginia and the College* (London, 1727), probably the best extant account of Virginia in the latter part of the seventeenth century, and published an elaborate series of sermons on *Our Saviour's Divine Sermons on the Mount* (4 vols., 1772, 3d ed., 1740), which have been much commended by theologians. Consult D. E. Motley, "Life of Commissary James Blair, Founder of William and Mary College," in Series 19, No. 10, of *Johns Hopkins University Studies* (Baltimore, 1901).

BLAIR, JOHN INSLEY (1802-99) An American capitalist and philanthropist. He was born in Warren Co., N. J., and from 1811 to 1819 worked in a small store in Hope, N. J. Later he removed to Blairstown, became interested in the Oxford Iron Furnace in Warren County, and in 1846 was associated with the Scranton Brothers in the first attempt to manufacture iron with anthracite coal. He and his associates constructed the road which subsequently became known as the Delaware, Lackawanna, and Western. In later life he was connected, either as builder or director, with 20 railroads, and at one time was said to own more miles of railroad than any other man in the world. He gave large sums to Princeton, Ginnell, and Lafayette colleges, and about \$600,000 to the Presbyterian Academy at Blairstown, and contributed toward building over 100 churches in the towns laid out along the lines of his railroads.

BLAIR, MONTGOMERY (1813-83) An American lawyer and statesman, the son of Francis P. Blair, Sr. He was born in Franklin Co., Ky., graduated at West Point in 1835, and served for several months in the first Seminole War. He then resigned from the service, studied law, was admitted to the bar in 1839, and began to practice in St. Louis. He was for a time United States district attorney for Missouri, was mayor of St. Louis in 1842-43, and from 1843 to 1849 was judge of the Court of Common Pleas of that city. In 1852 he removed to Maryland, where he devoted his attention as a lawyer chiefly to important cases before the United States Supreme Court and quickly became prominent as a Democrat in State politics. From 1855 to 1858 he was United States solicitor in the Court of Claims, and in 1857 was the counsel for the defendant in the celebrated *Dred Scott Case* (q.v.). Strongly disapproving of the attitude of the Democratic party toward the repeal

of the Missouri Compromise in 1854, he joined the newly organized Republican party in 1856, and in 1860 was chairman of the State Republican Convention. In 1861 he became a member of Lincoln's cabinet as Postmaster-General, and continued in that office until September, 1864, when he resigned. During his term money orders first came into use, and free delivery in cities and the sorting of the mails on postal cars were introduced. After the war Blair returned to the Democratic party, and in 1876-77 was a supporter of Tilden in the Tilden-Hayes controversy. He published his *Speech on the Causes of the Rebellion* (1864).

BLAIR, ROBERT (1699-1746). A Scottish clergyman and writer. He was born in Edinburgh, was educated at the university there and in Holland, was licensed to preach in 1729, and from 1731 until his death was settled at Athelstaneford in East Lothian. Besides an elegiac poem and several paraphrases of Scripture which have been totally forgotten, he wrote the forcible but strikingly lugubrious poem of 767 lines, entitled *The Grave*, which, first published in 1748, enjoyed considerable popularity and was frequently reprinted.

BLAIRSVILLE. A borough in Indiana Co., Pa., 53 miles by rail east of Pittsburgh, on the Pennsylvania Railroad and on the Conemaugh River, here spanned by two bridges (Map. Pennsylvania, C 6). It is the seat of Blairsville College (female), a Presbyterian institution opened in 1851, and has a public library. In the town are railway shops, foundries, and machine shops, enameling plants and manufactories of plate glass and lumber. Blairsville was settled in 1818 and was incorporated in 1825. The government is vested in a mayor, elected every three years, and a unicameral council. The water works are owned by the borough. Pop., 1910, 3572.

BLAISE. See BLASIUS.

BLAKE, EDWARD (1833-1912). A Canadian statesman. He was born in the county of Middlesex, Ontario, and was educated at Upper Canada College and Toronto University, where he graduated in 1854. He chose the legal profession, was called to the bar in 1856, and soon gained a large equity practice. His keen interest in the issues which precipitated Confederation (see CANADA, *History*), together with his ability as a lawyer and public speaker, early indicated his aptitude for politics. In 1867 he was elected a Liberal member of the House of Commons and also of the Ontario Legislature, representation in both houses then being legal. In 1869 he became leader of the Liberal Opposition in the Ontario Legislature, and in 1871, after the resignation of John Sandfield Macdonald, he became Premier of the province. The abolition of dual representation in 1872 caused him to resign the provincial premiership and enter Dominion politics. In 1873 he took a prominent part in opposing the political bargain commonly known as the Pacific Railway Scandal, which caused the overthrow of the administration of Sir John Alexander Macdonald. His parliamentary and platform speeches at this crisis displayed powers of argument and destructive criticism which enabled him intellectually to dominate his party during the remainder of his Canadian activity. In the Liberal cabinet of Alexander Mackenzie, Blake in 1873 became a minister without portfolio and soon resigned on account of ill health,

but after recovery he accepted in 1875 the office of Minister of Justice. His ability in constructive legislation was chiefly shown in the measure creating the Supreme Court of Canada, but after 1878, when the Mackenzie government was defeated, further opportunity of this kind was denied him. In 1880 he was chosen leader of the Liberal Opposition; but in subsequent general elections his party was unsuccessful, and in 1887 he resigned. Mr. (afterward Sir) Wilfrid Laurier being appointed his successor. Reasons for partial disagreement with his party and for his retirement from its leadership were disclosed in a letter published in 1891, in which he opposed, as leading to political absorption by the United States, the policy of commercial union advocated by a section of the Liberals. In 1892, in response to an invitation by Irish Nationalists, he entered Imperial politics and was elected member for South Longford, Ireland, in the British House of Commons. He rendered signal service to the Nationalists, his Canadian experience enabling him authoritatively to present the cause of Irish home rule in its more hopeful aspects and larger Imperial relations. In 1896 he was a member of the committee appointed to investigate South African affairs, and his work in connection therewith was notable for his cross-examination of Cecil Rhodes. In addition to his political services Blake frequently appeared, both in Canada and Britain, as legal counsel in cases of high importance and also as arbitrator. He was deeply interested in higher education and founded scholarships in political science in Toronto University, of which he was for a time chancellor. In the earlier part of his career he was an ardent advocate of Imperial federation, but later became more conservative in his outlook. He was a man of high moral ideals and strict political integrity, and though but a short time in office, he strongly influenced public opinion and the course of legislation. In 1907 he retired from public life and returned to Toronto, where he afterward died. Consult Dent, *The Last Forty Years* (Toronto, 1881), and Willison, *Sir Wilfrid Laurier and the Liberal Party* (Toronto, 1903).

BLAKE, ELI WHITNEY (1795-1886). An American inventor. He was born in New Haven, Conn., and graduated at Yale in 1816. Blake assisted his uncle, Eli Whitney (q.v.), in the management of the gun factory at Whitteville and on his uncle's death assumed full charge. In conjunction with his brother, he afterward established a hardware factory at Westville. Blake is best known for his invention of a stone-breaking machine. He wrote several scientific papers, the most noteworthy being *Original Solutions of Several Problems in Aerodynamics* (1882).

BLAKE, FRANCIS (1850-1913). An American inventor, born at Needham, Mass. In 1866-79 he was connected with the United States Coast Survey and in 1878 invented the transmitter for telephone instruments, which, known under his name, has become the most extensively used throughout the world. He patented other electrical devices, also.

BLAKE, JAMES HOPWOOD (1843-1901). An English geologist and surveyor, born in London. He was educated there at King's College and apprenticed to the civil engineer Brereton, under whose direction he was for several years engaged in railway engineering and construction in

Cornwall and South Wales. In 1868 Blake joined the Geological Survey of Great Britain and was commissioned to prepare large scale maps of certain portions of southern England. He surveyed parts of Somerset, Suffolk, and Norfolk, and studied the phenomena of the drift deposits of those regions. Several contributions, embracing the results of his observations on the drift and the Mesozoic formations, have been published in the *Memoirs of the Geological Survey of the United Kingdom* and in the *Geological Magazine*.

BLAKE, LILLIE DEVEREAUX (1835-1913) An American woman suffragist and reformer. She was born in Raleigh, N. C., and was educated in New Haven, Conn. She married, in 1855, Frank G. Q. Umsted, a Philadelphia lawyer, who died in 1859, leaving her with two children to support. She turned her attention to literary work, her first story, *A Lonely House*, appearing in the *Atlantic Monthly*. In the next few years she completed two successful novels, *Southside* (1859) and *Rockford* (1862). In 1866 she married Giffill Blake, a wealthy New York merchant. She was one of the active promoters of the movement that resulted in the founding of Barnard College and was prominent as a speaker on educational topics. She also identified herself with the woman's suffrage movement and delivered many addresses on the subject throughout the country. She was president of the New York State Woman's Suffrage Association from 1879 to 1890 and of the New York City Woman's Suffrage League from 1886 to 1900. She was largely instrumental in securing the passage in 1880 by the New York Legislature of the law permitting woman's suffrage in school elections and was the author of the law providing for matrons in the police stations passed in 1891, and of that requiring storekeepers to provide seats for saleswomen. In addition to the books mentioned, her writings include *Fettered for Life* (1872), a novel dealing with the woman's suffrage question, *Woman's Place To-day* (1883), lectures delivered in reply to a series of Lenten sermons on "Woman," by the Rev. Morgan Dix, *A Daring Experiment* (1894).

BLAKE, ROBERT (1590-1657) An English soldier and admiral of the Commonwealth. The eldest of 12 sons of a merchant, he was born at Bridgewater, Somerset, in August, 1590. He studied at Oxford from 1615-25, taking his degree of M. A. in 1623 at Wadham College. When the Civil War broke out, he raised a troop in Somersetshire and narrowly escaped hanging for prolonging the defense of Bristol, when the Governor had capitulated. Parliament subsequently appointed him lieutenant colonel, and by his obstinate defense of Lyme with 500 men against Prince Maurice's 5000, he seriously damaged the reputation of that warrior, who retired in disgust. In 1644 he surprised Taunton, of which place he was made Governor, and gave proof of no mean military skill by defending the place against an overwhelming force, until the town was little better than a heap of ruins, when the siege was raised. In 1649, in conjunction with two other officers of equal rank, he was appointed general of the sea, the two services, military and naval, at that time not being distinct. This was Blake's true sphere. After an exciting hide-and-seek chase of several months, in 1651 he destroyed the squadron of Prince Rupert, which had sought safety in the

Tagus, and forced the Royalists to surrender Guernsey, Jersey, and the Scilly Isles. On the outbreak of the Dutch War in March, 1652, he was made sole admiral of the fleet for nine months, and during this year fought four engagements with Dutch fleets under Tromp, De Ruyter, and De Witt. In the first, on May 19, the Dutch retreated under cover of darkness, with the loss of one man-of-war captured, and another sunk. In the next engagement, a squadron of 12 ships, sent to protect the herring vessels from the attacks of Blake, were captured, and in the third, on September 23, 3 Dutch vessels were destroyed, and the rear admiral taken. On November 29 a fleet of 80 vessels, under the command of Tromp, encountered Blake with only 40 off the Goodwin Sands. The result of the action was the loss of 6 English ships—2 captured and 4 destroyed, the rest, in a shattered condition, sought safety in the Thames. There is a story, now discredited, that Tromp tied a broom to the masthead of his vessel, and sailed through the Channel, intimating that he had swept English vessels clean out of it. If he did, his pride was short-lived, for by February, 1653, Blake was at sea again with 80 ships, and falling in with Tromp with about an equal force, was at once attacked, but after a three days' running fight, the Dutchman was forced to seek shelter in the shallow waters of Calais, with a loss of 11 men-of-war, and 30 of a fleet of merchantmen he had in convoy. The English lost only one ship, but Blake was severely wounded. On the 3d and 4th of June his coadjutors, Dean and Monk, won another victory over Tromp, and his wound alone prevented Blake from taking part in the engagement of July 31, which finally shattered the naval supremacy of Holland. In 1654 Blake was appointed by Cromwell to command an English fleet in the Mediterranean, where he soon made the British flag respected by Dutch, Spanish, and French. The Dey of Tunis refused to pay homage to it. Blake attacked his capital, burned the Turkish fleet of nine ships which lay before it, accomplished a landing, and with a body of 1000 men annihilated an army of 3000 Turks. He next sailed to Algiers and Tripoli, landed, and set free all the English who were detained as slaves. He concluded alliances favorable to England with Venice and Tuscany. In 1657 he defeated the Spaniards at Santa Cruz. This was, perhaps, one of the most daring actions in Blake's career. With a wind blowing right into the bay—which was very strongly defended—Blake dashed in, attacked and destroyed the Spanish galleons and slipping in the harbor, and, the wind fortunately changing, sailed out again with a loss of only one ship and 200 men. The Spanish loss in men and property was immense, and the terror the action inspired insured increased respect to the English flag. His health now failed, he returned to England, and died, as his ship entered the harbor of Plymouth, Aug. 7, 1657. Cromwell honored his memory by a solemn funeral procession, and caused him to be interred in Westminster Abbey, whence his body, with those of other Revolutionary celebrities, was removed by royal command at the Restoration. Consult Gaudiner, *History of the Commonwealth and Protectorate* (New York, 1894-1901), with full citation of the original authorities, Samuel Johnson, *Life of Blake* (London, 1792), Dixon, *Robert Blake* (London, 1852), Stevenson, *Admiral Robert*

Blake (London, 1910). For the principal original materials, consult *Calendars of State Papers, Domestic* (London, 1649-57), and Thurlow, *State Papers* (London, 1742).

BLAKE, WILLIAM (1757-1827). An English engraver and poet. He was born in London Nov. 28, 1757. In 1789 he published *Songs of Innocence*, followed in 1794 by *Songs of Experience*, showing the two contrary states of the human soul, with about 60 illustrations remarkable for their original manner. The poems were equally singular, but many of them of the purest poetic quality. Some marginal designs for Young's *Night Thoughts*, executed by Blake, were greatly admired by Flaxman. Blake lived in the full belief that he held converse with the spirits of the departed great—with Moses, Homer, Vergil, Dante, and Milton. He published numerous designs, chiefly of religious and cognate subjects, among the best of which are his *Inventions to the Book of Job*, and the illustrations of Blair's *Grave*. He died (Aug. 12, 1827) in poverty and obscurity, with the conviction that he was a martyr to poetic art. The influence of Michelangelo is traceable in his art; but the imagination which produced his bold and often curious designs was peculiarly Blake's own, while in his diction, though at times almost irrational, he was, according to Swinburne, "the single Englishman of supreme and simple poetic genius of his time," and Charles Lamb regarded him as one of the most extraordinary persons of the age.

He has of late been made the object of a sort of cult. The facts of Blake's early life are recorded in a book, now rare, written by Dr. Malkin, *A Father's Memoirs of his Child* (1806). Consult: Gilchrist, *Life and Works of William Blake* (2d ed., London, 1880); Swinburne, *William Blake: A Critical Essay* (London, 1868); *Poetical Works of William Blake*, ed. W. M. Rossetti (London, 1874); and *Works*, edited with lithographs of the illustrated "Prophetic Books," and memoir and interpretation, Ellis and Yeats (London, 1893); besides his *Life* by Russell (London, 1906) and Selincourt (1909); and among other recent books of a biographical character, Selincourt, *William Blake* (London, 1909); Ellis, *The Real Blake* (London, 1907); Chesterton, *William Blake* (London, 1911). A. G. B. Russell, *Engravings of William Blake* (1912); Mrs. Blake's letters were edited by Tatham (New York, 1906), with a short biography. The essays on Blake in W. B. Yeats, *Ideas of Good and Evil* (1903), are excellent.

BLAKE, WILLIAM HUME (1809-70). A Canadian jurist. He was born in Kiltegan, county Wicklow, Ireland, and was educated at Trinity College, Dublin. Undecided temporarily as to his future course, he studied surgery under Sir Philip Crampton, and afterward began to study theology with the view of entering the Church of England, but in 1832 he emigrated to Upper Canada and settled on a farm in Middlesex County. In a few years he removed to Toronto, studied law, and in 1838 was called to the bar. He soon attained eminence in his profession, but was strongly interested in the political issues which agitated the province and ardently sympathized with the Reformers in their struggle for responsible government. (See *POLITICAL PARTIES, Canada*.) In 1848 he was elected to the Legislature for East York (now Ontario County) and in the same year was ap-

pointed Solicitor-General for Upper Canada in the Lafontaine-Baldwin ministry. His powers of debate and oratory were great and on two or three occasions rose to heights altogether exceptional, but his parliamentary career was short. In 1849 he prepared the act reforming the practice and organization of the Court of Chancery in Upper Canada and resigned from the ministry in order to become in 1849 the first chancellor of the court. His judgments commanded wide respect and placed the business of the court upon a sound basis. In March, 1862, he resigned on account of failing health, and eight years later he died in Toronto.

BLAKE, WILLIAM PHIPPS (1826-1910). An American scientist. He was born in New York, graduated at the Sheffield Scientific School in 1852, was mineralogist and geologist of the Pacific Railroad Exploring Expedition of 1853, and author of several of the reports. He edited the *Mining Magazine* (1859-60), was mining engineer for the Japanese government in 1862, and in 1863 was appointed professor of mineralogy in the College of California and geologist to the State Board of Agriculture. He was commissioner for California at the Paris Exposition of 1867, was executive commissioner for Connecticut in the Centennial Exposition, and was special agent to Vienna in 1873. From 1896 to 1905 he was professor of geology and director of the School of Mines at the University of Arizona, and in 1898, territorial geologist. He published *Silver Ores and Silver Mines* (1860); *Report on the Production of Precious Metals* (1867); *Ceramic Art and Glass* (1878); *Tombstone and its Mines* (1902).

BLAKE/LOCK, RALPH ALBERT (1847-). An American landscape and figure painter. He was born and educated in New York City, where he graduated from the City College in 1869. His art is self-acquired, the result of many experiments. His early work is therefore crude, but his progress was rapid, and at his best he ranks as one of the foremost American landscape painters, particularly in evening and moonlight subjects. His theme is usually the forest primeval with mysterious glades peopled by red men. He is essentially a tone painter, who sees in nature the means of attaining emotional effects rather than a subject to be literally transcribed. His principal pictures include: "Indian Girl, Uinta Tribe," "Shooting the Arrow" (1880), "Bannock Wigwam in Peaceful Vale" (1883), "Autumn" (Mrs. Kurtz, New York); a beautiful moonlight scene, in the Lambert collection, Paterson, N. J., "Sunset, Navarra Range" (W. T. Evans, New York); the "Pipe Dance," Metropolitan Museum of New York, one of his finest productions. Before 1900 he lost his reason and is no longer productive. In 1913 he was accorded the tardy honor of membership in the National Academy of Design.

BLAKELY, blak'li, JOHNSON (1781-1814). An American naval officer, born near Seaford, Ireland. He emigrated with his parents to the United States, graduated at the University of North Carolina in 1800, and in the same year entered the United States navy. In 1813 he became commander of the *Wasp*, a new sloop of war, and in his first cruise captured the English sloop *Reindeer*. On another cruise he captured several prizes and defeated the *Acon* and the *Aialanta*. Late in 1814 the *Wasp* left on a cruise, but never returned to port, and was presumably wrecked.

BLAKESLEE, ALBERT FRANCIS (1874-) An American botanist, born at Geneseo, N. Y., brother of George Hubbard Blakeslee. After graduating from Wesleyan University (Conn.) he served as assistant in botany at Harvard in 1899-1900, as instructor at Radcliffe College in 1900-02, and as a teaching fellow at Harvard in 1901-03. He was a collector in Venezuela for the Harvard Cryptogamic Herbarium in 1903, and an investigator in Europe for the Carnegie Institution in 1904-06, taught botany at Harvard, and in 1907 became director of the Summer School of the Connecticut Agricultural College. He is known for his investigations of sex in plant life. His works include *Sexual Reproduction in the Mucosaeae* (1904), and *Trees in Winter* (1911, new ed., 1913).

BLAKESLEE, GEORGE HUBBARD (1871-) An American educator and author, born in Geneseo, N. Y., brother of the preceding. He graduated from Wesleyan University in 1893 and studied also at Johns Hopkins, Harvard (Ph.D., 1903), Berlin, Leipzig, and Oxford. In 1903 he became instructor of history in Clark College and in 1911 professor of the same subject in Clark University, Worcester, Mass., where he was associated with President G. Stanley Hall in founding and editing *The Journal of Race Development* and in organizing the annual conference at Clark University on international problems. In 1906-08 he traveled in Russia, China, the Philippines, and Hawaii, and his principal published works deal with the Orient. They include contributions to the *Outlook* and other periodicals, and the books *The Far East* (1906), *The Near East and Africa* (1910), *Japan* (1911). He edited *China and the Far East* (1910) and *Japan and Japanese-American Relations* (1912)—both volumes of Clark University lectures.

BLANC, CHARLES (AUGUSTE ALEXANDRE PHILIPPE) (1813-82). A French historian and critic of art. He was born at Castres and was a brother of the historian Louis Blanc. He studied engraving with Calametta and Mercuri, achieving some proficiency in the art, but he is chiefly known through his writings and critical work. In politics an ardent Republican, he was head of the Department of Fine Arts in the Ministry of the Interior from 1848 to 1852 and again from 1871 to 1873. He was chosen to the French Academy in 1876 and became professor of aesthetics at the College de France in 1878. He is chiefly known as the editor of and contributor to the *Histoire des peintres de toutes les écoles* (14 vols., 1849-75), for which he wrote biographies of the artists of the Dutch and French schools. This work was also published in English. He also wrote *L'Œuvre complet de Rembrandt* (1873), *Grammaire des arts du dessin* (1876), a very important work, and *Grammaire des arts décoratifs* (1881), its sequel. He was the founder and until his death the editor of the *Gazette des Beaux-Arts*.

BLANC, JEAN JOSEPH LOUIS (1811-82). A French socialist and historian, born in Madrid, Oct. 20, 1811. In 1820 he was placed in the college at Rodez, in 1830 he went to Paris and became a clerk in an attorney's office for a short time, and in 1832 became private tutor at Arras. Here he resided for two years, contributing largely, on literary and political subjects, to the *Progrès du Pas-de-Calais*. He afterward went to Paris, where he contributed to various political papers, and where in 1839 he founded

the *Revue du Progrès*, in which he first laid down some of his socialistic theories. In this journal, too, he brought out his famous treatise on socialism, the *Organisation du travail*, which in 1840 appeared in a reprint. The book obtained for its author general recognition as one of the ablest of Socialist writers, as well as wide popularity among the French workingmen, who were captivated by the brilliancy of the writing, the apparent simplicity of the scheme, and the freshness of the views advocated. The book denounces the doctrine of individualism, i.e., individual and competitive efforts in labor, and advocates the absorption of the individual in a vast "solidarity," where "each would receive according to his needs and contribute according to his abilities." Blanc next published (in 1841-44) a historical work entitled *Histoire de dix ans, 1830-40*, aimed with deadly effect against the Orleans dynasty. Louis Philippe afterward declared that "it acted like a battering ram against the bulwarks of loyalty in France." It owed its success partly to the exposure it gave of the scandalous jobbery and immorality of the crown and its advisers, partly to that passionate ardor which substituted vehemence for history, and its academic pomp of style. This was followed by the first volume of a *Histoire de la révolution française*, in which the author's aim was to describe, from his own point of view, not only the incidents of the first Revolution, but the social history of the eighteenth century. In the February Revolution of 1848 Blanc played an important part. His popularity with the working classes led to his being appointed a member of the Provisional government. On February 25 he forced his colleagues in the Provisional government to accept the principle of a governmental guaranty of employment. Three days later he demanded the creation of a ministry of labor, but was induced to accept instead the appointment of a commission authorized to inquire into the conditions of labor. Louis Blanc was made the head of this commission, but found himself quite without power to achieve anything of importance. At the same time Marie, Minister of Public Works, began, but without Blanc's cooperation, to establish the so-called national workshops (*ateliers nationaux*), which were to make effective the governmental guaranty of employment. All men out of employment, it was proclaimed, might appear at certain public offices and demand work on public improvements. Those thus employed were to receive two francs a day, those for whom no work was found were to receive one franc. The object of the Minister of Public Works was to make the *ateliers nationaux* as wasteful as possible, in order to discredit Louis Blanc. In this he was quite successful. The number of men on the public works steadily increased, the waste of public money was enormous. When the plan was abandoned, serious rioting followed, in which Louis Blanc, though always opposed to violence, was compromised. A proposal was made to prosecute him, but it was negatived by the National Assembly. After the June insurrection he was again accused and prosecuted for conspiracy, but he contrived to escape to London, where he resided until the fall of the Empire. During his exile he devoted himself to political and historical literature. In 1849 appeared his *Appel aux honnêtes gens* and *Catéchisme des socialistes*, in

1850, *Pages d'histoire de la révolution de février*, and in 1851, *Plus de Girondins; la république une et indivisible*. He acted also as correspondent for several Parisian journals, and a collection of his letters from London was published under the title *Dix années de l'histoire d'Angleterre* (10 vols., Paris, 1879-81). The work which has secured him the most enduring reputation is his *History of the French Revolution*, in 12 volumes, written during his residence in England. It is characterized by extensive and original research, which has frequently enabled the author to reverse the common verdicts on historical personages and to explode many of the extravagant stories of that stormy period. On the fall of the Empire in 1870 Blanc returned to France, and in 1871 he was elected to the National Assembly, where he pursued a policy of consistent radicalism without returning to his former Socialist theories. Louis Blanc may be regarded as the founder of state socialism. He was a vigorous critic of the anarchistic doctrines of Proudhon. Individual liberty, he believed, could exist only under a strongly centralized government. Industry, however, was not, according to his system, to be centralized. It was to be conducted in social workshops, in which the workers cooperate freely, choosing their own managers. The state was to provide credit to launch the workshops; beyond that it had nothing further to do except to fix prices of products. Consult Fiaux, "Louis Blanc," in *Portraits politiques contemporains*, vol. ii (Paris, 1883), and A. Jonannet, *Les théories sociales de L. Blanc* (Dijon, 1902).

BLANC, LE, le blān (Fr. the white; see below). A town in the department of Indre, France, beautifully situated on the Creuse, which divides the town into two parts, about 32 miles west-southwest of Châteauroux (Map: France, N., G 6). It is known principally for the beautiful Lake Blanc (3450 feet above sea level), near which it is situated, so called from the reflection of the quartz lining its bottom. Le Blanc has cloth and linen-yarn mills, potteries, tanneries, vinegar works, forges, etc., utilizing the surplus waters of the lake to furnish power for its machinery. It is very ancient and was frequented by the Romans. Pop., 1901, 6663; 1911, 6493.

BLANC, blānk, LUDWIG GOTTFRIED (1781-1866). A German philologist and Dante scholar. He was born in Berlin, and after studying at the French Theological Seminary of his native city, was called to a pastorate at Halle, in 1806. In 1811 he was suspected of having taken part in a conspiracy against King Jerome of Westphalia and was imprisoned until 1813, when he was released by a Russian flying corps. He was made professor of Romance languages at the University of Halle in 1822, and from 1838 to 1860 was one of the preachers at the cathedral of that city. Professor Blanc is known chiefly for his numerous and scholarly treatises on Dante. His most important works are his *Grammatik der italienischen Sprache* (1844), the first attempt to trace the history of the development of the forms and laws of that language; *Vocabolario Dantesco*, in French (1852); and his translation in unrhymed iambic verse of the *Divine Comedy*, with commentary (1864). His *Handbuch des Wissenschaftigen aus der Natur und Geschichte der Erde und ihrer Bewohner* (1867-69) also enjoyed a wide popularity.

BLANC, blān, MARIE THÉRÈSE. See BENTZON, TH.

BLANC, MONT. See MONT BLANC.

BLANC, (PAUL), JOSEPH (1846-1904). A French historical painter. He was born in Paris and studied with Bin and Cabanel, obtaining in 1867 the Roman prize. Among his principal canvases are: "Perseus" (Luxembourg, 1870); "The Invasion" (1873, Museum, Sedan); "The Vow of Clovis in the Battle of Tolbiac" (1876), containing many portraits of contemporary politicians, and the "Baptism of Clovis," both in the Pantheon, "Bigand's Wife" (1878); "The Triumph of Clovis" (1881); "The Tiber" (1885). His chief mural paintings are in the War Ministry and the cupola of the Hôtel de Ville, Paris, and in the churches of St. Paul and St. Louis, Paris, and of St. Pierre, Douai. He received a gold medal at the World's Fair of 1889 and was made professor in the Ecole des Beaux-Arts.

BLANCHARD, blān'chard, AMY ELLA (1856-). An American writer of juveniles. She was born in Baltimore, studied art in New York and Philadelphia, and for two years taught drawing and painting in Plainfield, N. J. Among her many stories for girls are: *Holly Berries*, in collaboration with Ida Vaughn; semi-historical tales like *A Girl of '76* (1898), *A Heroine of 1812* (1901), and *A Frontier Knight* (1904); and the "Corner" and "Little Maid" series.

BLANCHARD, EDWARD LITT LAMAN (1820-89). An English journalist and dramatist. He was born in London and in 1831 accompanied his father, the well-known comedian, William Blanchard, to New York, where he appeared upon the stage. Returning to England, he was engaged during the rest of his life as a dramatic critic for various papers and a writer of numerous plays, farces, and pantomimes. Of the latter he composed more than 100, which for their prettiness and ingenuity of conception have rarely been equaled, furnishing the Drury Lane pantomime for 37 consecutive years. He was also a prolific writer of short stories and was a staff writer at different times on the *Sunday Times*, the *Weekly Dispatch*, the *Observer*, the *London Figaro*, and the *Daily Telegraph*, his connection with the latter paper extending from 1863 until his death. He edited Thomas Dugdale's *England and Wales Delimited* (1860) and Willoughby's *Shakespeare*; and was the author of two novels, *Temple Bar* and *Man Without a Destiny*, and of several guidebooks. Consult Scott and Howard (editors), *Life of E. L. L. Blanchard* (London, 1891).

BLANCHARD, blān'shār', EMILE (1820-1900). A French naturalist, born in Paris. As assistant naturalist to the museum, he was several times appointed to represent Milne-Edwards in the entomology course. He became a member of the Academy of Sciences in 1862 and president of that institution in 1881. The following are his principal works: *Histoire naturelle des insectes orthoptères, neuroptères, etc.* (3 vols., 1840-41); *Histoire des insectes, traitant de leurs mœurs et de leurs métamorphoses en général* (2 vols., 1845); *La zoologie agricole* (1854 et seq.); *L'Organisation du règne animal* (1851-64); *La voie chez l'homme et les animaux* (1876); *La vie des êtres animés* (1888).

BLANCHARD, FRANÇOIS (1738-1809). A French aeronaut. In 1784 he attempted to build a balloon with wings or sails and a rudder, and

in 1785 he crossed the English Channel by balloon. In the same year he used, for the first time, a parachute according to Montgolfier's ideas and laid claim to the invention. He went to the United States in 1796 and gave many balloon exhibitions. In 1798, at Rouen, he took up 16 persons in a single balloon and landed them safely 15 miles away. His wife, **MARIE MADELINE SOPHIE ARMAND** (1778-1819), took part in the exhibitions with him and, after his death, with others. She lost her life in her sixty-seventh ascension. See **AERONAUTICS**.

BLANCHARD, JACQUES (1600-38). A French painter of the Renaissance. He was born in Paris and studied there under Nicholas Ballery. In 1624 he went to Rome with his brother, Jean Baptiste, and also spent some time in Venice and Turin. In Italy he studied the great Italian masters, especially Titian. Later both brothers worked in Lyons under Horace Le Blanc. Jacques was called by his contemporaries the "French Titian," because of the resemblance of his art, especially in color, to that of the great Venetian. Of his "Holy Families" and "Madonnas," which are especially prized, good examples are in the museums of Nantes, Bayonne, Bayeux, Toulouse, and Cherbourg. In the Louvre he is represented by "Charity" and a "St Paul in Meditation" (though this latter is possibly by his brother, Jean Baptiste), in the Metropolitan Museum, New York City, by "Venus and Adonis."

BLANCHARD, NEWTON CRAIN (1849-). An American legislator and public official, born in Rapides Parish, La., and educated at Louisiana State University and (in law) at Tulane. In 1879 he was a member of the Louisiana Constitutional Convention and from 1881 to 1893 was Representative in Congress. He was appointed (1893) United States Senator to fill the unexpired term of E. D. White, became in 1897 an associate justice of the Supreme Court of Louisiana, and from 1904 to 1908 was Governor of the State.

BLANCHARD, blan'chard, SAMUEL LAMAN (1804-45). An English journalist and author, born at Great Yarmouth. He was educated at St Olave's School, Southwark, and became clerk to a proctor of Doctors' Commons. He began at an early age to write for a journal called *The Drama*, was a traveling player and subsequently a proof reader. In 1827 he was appointed secretary to the Zoological Society and in 1828 published *Lynx Offerings*, a volume of verse dedicated to Charles Lamb. He was appointed acting editor of the *Monthly Magazine* in 1831 and in 1832 of the *True Sun*, a Liberal newspaper. He also edited the *Court Journal* in 1837, the *Courier* in 1837-39, *George Cruikshank's Omnibus* in 1842, and was a member of the *Examiner* staff from 1841 until his death. Among his friends were Douglas Jerrold, Dickens, Leigh Hunt, B. W. Procter, Browning, Cruikshank, and Bulwer-Lytton. Some of his essays were collected by Bulwer-Lytton as *Sketches of Life* (1846), and his poems by Blanchard Jerrold (1876). Another collection of essays appeared in 1855 as *Corporation Characters*.

BLANCHARD, THOMAS (1788-1864). An American mechanic and inventor. Among his inventions were a machine for making tacks, one for turning gun barrels, a lathe for turning gunstocks and other irregular shapes, a steam-wagon, before locomotives were used, contrivances to aid steamboats in ascending rapids, and

a machine for bending large timber. He received more than 25 patents for important inventions. The principle of his lathe for irregular shapes is now used in the pantagraph for reproducing statuary.

BLANCHE, blansh, AUGUST THEODOR (1811-68). A Swedish poet. He was born in Stockholm and studied law at the University of Upsala, but soon turned to literature, in which he soon established a reputation by his comedies *Kika Morbror* (1845), *Huttbarnet* (1847), and *En tragedi i Wimmerby* (1848). These and many others are still considered among the ornaments of Swedish dramatic literature. He also contributed brilliant sketches of Stockholm folk life to the feuilleton column of the *Illustrerad Tidning*. His complete works with a biographical sketch by Hedin, were published at Stockholm (15 vols., 1889-92).

BLANCHEFLEUR, blansh'fler'. See **FLORE ET BLANCHEFLEUR**.

BLANCHE OF CASTILE, kas-tel' (1188-1252). The daughter of Alfonso IX of Castile and Eleanor, daughter of Henry II of England. She was married, May 23, 1200, according to treaty, to Louis, heir apparent to the crown of France. After the death of her husband in 1226 she was regent during the minority of her son, Louis IX (qv), and as such she had to struggle against almost continuous revolts, and succeeded in suppressing a formidable conspiracy of the nobles. She acquired Toulouse by treaty and compelled the submission of the Duke of Brittany. Possessed of remarkable executive talent, she supervised personally all the departments of government, not excepting the army. She married her son to Margaret of Provence in 1234, and when she resigned her office two years later, she left France in a most flourishing condition. From 1248 to 1252 Blanche again acted as regent while Louis was gone on a crusade. The common people of France rebelled against the heavy taxation necessitated by the large outlays of the King on his crusading expeditions, but she put them down with a strong hand and in spite of all these embarrassments successfully conducted the government of the realm. France has seldom had so able a ruler, or one whose death was more universally lamented. She died in November, 1252. Consult Petit-Dutaillie, *Etude sur la vie et le règne de Louis VIII* (Paris, 1894), and Berger, *Histoire de Blanche de Castille* (Paris, 1895).

BLANCH FEE, or **BLANCH HOLDING** (Fr. *blanc*, white, referring to the payment in white metal, i. e., silver). One of the ancient feudal tenures in the land law of Scotland, the duty payable to the superior, or lord of whom the land was held, being in general a trifling sum expressed in silver instead of gold, or merely illusory, as a peppercorn. Anciently many estates in Scotland were held, both of the crown and other superiors, by this tenure, but with the decay of feudal tenures it has become obsolete. See **FEE**, **FEDERALISM**, **TENURE**.

BLANCHING (Fr. *blanchir*, to make white, from *blanc*, white, cf. Eng. *blank*). A process by which gardeners arrest the formation of chlorophyll and certain secretions in plants by the exclusion of light, thus depriving the leaves of much of their color and bitterness and making them more palatable. Celery and sea kale are familiar examples. Blanching practices vary with varying climatic and soil conditions. Blanching is generally effected by heaping earth

or litter or by placing boards about the parts to be bleached, tying heavy paper about the plant, covering with boxes or pots perforated at the top, etc. See CHLOROPHYLL.

BLANKENHORN, MAX LUDWIG PAUL (1861-). A German geographer. His publications include: *Die Geognostischen Verhältnisse von Afrika* (1888); *Grundzüge der Geologie und Physikalischen Geographie von Nord-Syrien* (1891); *Entstehung und Geschichte des Toten Meeres* (1896); *Geologia Aegyptens* (1901); *Naturwissenschaftliche Studien am Toten Meer in Jordantal* (1912).

BLANCO, blay'kō, CAPE. See CAPE BLANCO.

BLANCO, GUZMÁN. See GUZMÁN BLANCO.

BLANCO, JOSÉ FELIX (1782-1872). A Venezuelan patriot, born at Caracas. He was ordained as a priest in 1801, but nevertheless took an active part in the movement for Venezuelan independence and became chaplain in the Revolutionary army. In 1818 his favorable report upon the possibilities of the campaign induced Bolívar to invade New Granada. In 1830 Blanco was made brigadier, and after the separation of Venezuela from Colombia, became, successively, Governor of Maracaibo, Minister of War (1837), and Minister of Finance (1854). The fall of Monagas forced him to retire, and he returned to the Church. The best years of his life were spent in preparation of his work, in 16 volumes, *Documentos para la historia de la vida pública del Libertador de Colombia, Perú y Bolivia*, published posthumously in Caracas in 1877.

BLAND, EDITH NESBIT (1858-). An English poet, born in London, and educated in London and on the Continent. She married Hubert Bland in 1879. Her publications include verse and several delightful children's books and stories. Her poem on the Queen (1901) was by far the best occasioned by the death of Victoria. Among her publications are: *Lays and Legends* (1st series, 1886; 2d series, 1892); *Leaves of Life* (1888); *A Pomander of Verse* (1895); *In Homespun* (1896); *Songs of Love and Empire* (1897); *Grim Tales* (1893); *The Story of the Treasure-Seekers* (1896); *Pussy and Doggy Tales* (1899); *The Book of Dragons* (1900); *The Literary Sense* (1903); *The Phoenix and the Carpet* (1904); *The Rainbow and the Rose* (1905); *The Incomplete Amovist* (1906); *The House of Arden* (1908); *Daphne in Fitzroy Street* (1909); *Railway Children* (1913).

BLAND, RICHARD PARKS (1835-99). An American legislator, born near Hartford, Ky. He emigrated to Missouri, thence to California, and from California to Utah Territory, where in 1860 he was admitted to the bar. Having returned to Missouri, he there continued the practice of law and in 1872 was elected as a Democrat to the National House of Representatives, in which he served until 1895 and from 1897 until his death. As a Congressman he is best known for his connection with the free-silver movement. In the Forty-third Congress he stoutly opposed the bill for the demonetization of silver, afterward styled by him "the crime of '73." He voted in 1874 for the bill, vetoed by President Grant, for the increase of greenback circulation, and in 1878 introduced a bill, the famous Bland Silver Bill, which, as amended by the Senate and passed over the veto of President Hayes, provided for the coinage of not less than \$2,000,000 nor more than \$4,000,000 worth of silver bullion a month, and continued in force

until repealed by the passage of the Sherman Law in 1890. His published speeches include *Proposed Annexation of Hawaii* (1898). Consult W. V. Byars, *An American Commoner: The Life and Times of R. Parks Bland* (Columbia, Mo., 1900). See BIMETALLISM.

BLAND, THEODORIC (1742-90). An American patriot and author. He was born in Prince George Co., Va., was educated in medicine in Edinburgh, and practiced in Williamsburg for some years. On the approach of the Revolution he took an active part in the controversies with Lord Dunmore (q.v.) and attracted especial attention by a series of papers written under the pen name "Cassius." When the Revolution came on Bland became captain of the first troop of Virginia cavalry. In 1777 he joined the main army and later rose to be colonel. He was an intimate friend and confidant of Washington. He was a member of Congress from 1789 to 1790. The *Bland Papers*, which contain valuable historical material covering the period of the Revolution, were collected and edited by Charles Campbell (Parkersburg, 1840).

BLANDRATA, blán-drá'tá, properly **BIANDRATA**, byán-drá'tá, Grogro (c.1515-c.1588). An Italian physician. He was born at Saluzzo, Piedmont. He practiced at Pavia, but, suspected of heresy, was compelled to escape to Geneva. Here his anti-Trinitarian views, which persisted despite the *Responsum ad Questiones G. Blandratos* (1559) of Calvin, involved him in violent controversy with the latter. From Geneva he went to Poland and subsequently to Transylvania, where he became physician-in-ordinary to Prince John Sigismund, whom he numbered among his converts. In both countries he was the first to introduce the doctrines of Unitarianism. In 1566 he defended his doctrines against Reformed theologians in public disputation. In his old age he lost his youthful ardor for proselyting and became reconciled with the Catholic church. His most important work, the *Professioni di fede antitrinitaria*, was edited by Henka (1794). Consult Malacarne, *Commentario delle Opere di Giorgio Blandrata* (Padua, 1814).

BLANKENBERGHE, blán'ken-bér'k. A favorite seaside resort in the province of West Flanders, Belgium, on the North Sea, 9 miles north of Bruges, and 12 miles northeast of Ostend. It has a fine beach, a paved promenade along the sand dunes 22 yards wide and over a mile in length, handsome residences, and a casino with a concert room to accommodate 4000 persons. Its popularity dates from 1840, and it is now visited annually by over 25,000 tourists. Permanent pop., 1900, 5640; 1910, 6053.

BLANKENBURG, RUDOLPH (1843-). An American manufacturer, philanthropist, and public official, born in Lippe-Deimold, Germany. He was educated in private schools and in the Real Gymnasium of that city. In 1865, removing to the United States, he was for 10 years traveling salesman and buyer for a manufacturing house, and later built up an important business of his own. He retired with great wealth in 1909. Since 1877 he had been active in reform politics and in attempts to bring about civic improvements in Philadelphia, early helping to establish the charity organization in that city, and also prominent on the Citizens Permanent Relief Commission, designed to furnish assistance to the region in Russia suffering from famine. In the 1905 reform movement he was elected county commissioner by nearly 50,000

majority His three years' salary, amounting to \$15,000, he gave to the police, firemen's and teachers' pension funds In 1911 he became candidate of the Keystone party (a fusion of Democrats and Independents) for mayor of Philadelphia The city had been for years under the domination of a notoriously corrupt Republican organization The election of Nov 8, 1911, resulted in the choice of Mr Blankenburg by a plurality of about 4000 votes His administration became notable for many important improvements in the city's government and in its business and commercial affairs The carrying out of his plans received something of a check in the fall of 1913, when, although he himself continued in office, the Republicans gained a majority in the city council Mayor Blankenburg is known as a contributor of articles and papers on political, social, and religious subjects to magazines and newspapers, and as a speaker in many States He was for many years an extensive traveler in foreign countries

BLANKET (Fr *blanket*, originally, a kind of white woolen stuff, dimin of *blanc*, white, cf Eng *blank*) A sheet of heavy woolen or partly woolen cloth, which is used for beds, for horse coverings, and to wrap around the person In the early years of the last century, especially from 1812 to 1816, the manufacture of blankets in the United States was confined to the production of coarse qualities, chiefly for the military and naval forces The War of 1812 gave a great impetus to woolen manufactures, and factories sprang up everywhere, but with the restoration of peace these enterprises met with disaster because of the superior goods that were imported at much lower prices In 1831 a large mill for the manufacture of cotton-warp blankets for the use of slaves was erected near Pendleton, S C It is said that in the same year a factory was built near Buffalo, N Y, for the manufacture of Mackinaw or Indian blankets In 1860 the census reports stated that the manufacture of blankets was carried on in 19 different States, and that the total output was 616,400 blankets, which were produced chiefly in Maine, Massachusetts, New Hampshire, Pennsylvania, and California The manufacture of blankets increased largely during the Civil War and in the years immediately following, and the importations decreased proportionally Since that time the values of the finer grades of white bed blankets have become much reduced, and the production of the poorer qualities discontinued Since about 1880 great advances have been made in the manufacture of blankets, and those of lighter weight, but more fleecy finish, are preferred to the heavy grades of former years Superior grades were formerly manufactured in California and Oregon, costing over \$20 per pair, or more than \$2 per pound All-wool blankets can be obtained from \$5 upward, while cheap blankets can be bought as low as \$2 a pair

The best blankets are made wholly of wool, but those of medium or inferior qualities are formed of cotton warp and woolen filling threads, the aim of the manufacturer being to raise the fibres of the woolen yarn into a loose, soft mat on the face of the blanket so as to hide the threads below Extraordinarily fine woolen blankets have been made in Mysore in India, some of which, it is said, are so delicate that though 18 feet long, they can be rolled inside a hollow bamboo Such fancy blankets

cost about \$150 The blankets made by the Navajo (qv) Indians of northern Arizona and New Mexico are much sought after where durability and warmth are desired The Navajos occupy a reservation of 8,000,000 acres in northern Arizona and New Mexico, they are the most civilized of the Indian tribes, and number about 16,000 They possess about 1,000,000 sheep, which they raise for their wool to make into blankets The wool which comes from their flocks is rudely carded and spun on a spindle resembling a boy's top The loom consists of two horizontal beams, one hung above the other and the warp stretched between The shuttle is a stick The colors most used are black, red, blue, and yellow, the patterns are geometrical designs The value of a Navajo blanket depends upon its weight The average weight is 20 pounds, and the value in 1913 was from \$1 to \$2 per pound They were much sought after by tourists as well as for decoration, on account of the rich coloring Blankets are also made by other Indian tribes of the Southwest, and specimens are shown in the accompanying Colored Plate Consult Hollister, *The Navajo and his Blanket* (Denver, 1903).

BLANK VERSE (refers to absence of rhyme, probably from *blank*, lacking a part necessary for completeness, as eg in "blank" cartridges, containing powder but no ball) Verse without rhyme The typical line contains five feet, or measures each measure having two syllables A stress of the voice, varying in degree, comes regularly on the second syllable in each measure, though this stress is frequently thrown back upon the first syllable Still greater ease of movement is attained by an extra syllable at the end of a line or before the caesura Any measure may also contain three syllables, and irregular measures occur in which there is only one syllable This structure may be illustrated in the following lines from *Macbeth*, if, however, we neglect the so-called anacrusis (See **ANACRUSIS**)

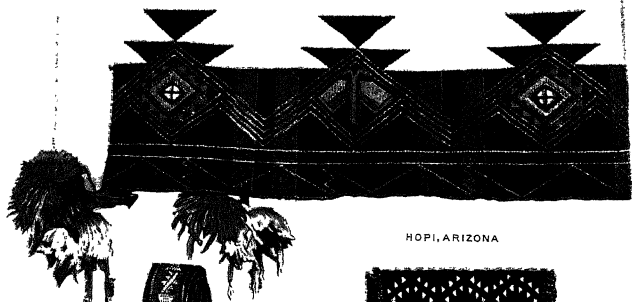
This eða | tie háth | a pléas | ant seát, | the fir
Nimby | and swéet | ly ré | comménds | jecélf
Unto our gén | tle sém | es | This guést | of súm | mer, etc

Again

The mul | titú | dínoús séas | inóar | nadíne

The classical productions of the Greek and Roman poets—at least such of them as have come down to us—are composed usually without rhyme, and, accordingly, when the passion for imitating classical models set in, rhyme came to be looked upon as an invention of Gothic barbarism, and attempts were made in several countries to shake it off The first specimen of blank verse in English is a translation from Vergil's *Æneid*, by the Earl of Surrey (d 1547), but it had been used by Italian and Spanish writers as early as about the beginning of that century Surrey derived it from Italy First employed in the drama by Sackville in *Gorboduc* (1561), it was perfected by Marlowe and Shakespeare It has since continued dominant in our poetic drama if we except the effort made by Dryden and others, after the Restoration, to return to rhymed plays But in other kinds of poetry, it was not till the appearance of *Paradise Lost* (1667) that it could be said to have taken root, and even then the want of rhyme was felt, as the poet expected it would be Many poets have since followed Milton's example, and English narrative, didactic, and

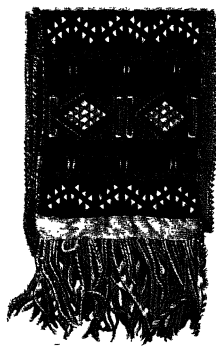
INDIAN BLANKETS



HOPI, ARIZONA



ZUÑI, NEW MEXICO



ZUÑI, NEW MEXICO



NAVAJO, NEW MEXICO

descriptive poetry is partly in blank verse and partly in rhymed couplets. Of recent poets, Wordsworth, Tennyson, and Sir Edwin Arnold have written the best blank verse. In Italian, French, and Spanish it never became popular; but under the influence of the English example, it was introduced into Germany by Lessing and others. Consult: Mayor, *Chapters on English Metre* (London, 1886, revised ed., 1901); J. Schipper, *Englische Metrik*, part II (Bonn, 1888); Gummere, *A Handbook of Poetics* (New York, 1885); Oman, *Versification* (London and New York, 1900); and George Saintsbury, *Historical Manual of English Prosody* (1910). See ALLITERATION; ASSONANCE; MALLARMÉ; RHYME; STÉPHANE; VERS LIBRES; VERSIFICATION, with the bibliographical notices appended to those articles.

BLANQUI, bli'nik', JÉRÔME ADOLPHE (1798-1854). A French economist. He was born in Nice, Nov. 28, 1798. After 1814 he pursued his studies in Paris, where, under the influence of J. B. Say, he turned to political economy. Upon Say's recommendation he was appointed in 1825 professor of history and of industrial economy in the Commercial School in Paris. On the death of Say he was appointed professor of industrial economy in the Conservatoire des Arts et Métiers and was one of the editors of the *Dictionnaire de l'industrie manufacturière, commerciale et agricole*. At the instance of the Academy of Moral and Political Sciences he prepared studies of economic conditions in Corsica, Algeria, and in England. He died in Paris on Jan. 28, 1854. His principal works are: *Résumé de l'histoire du commerce et de l'industrie* (Paris, 1820); *Précis élémentaire d'économie politique, précédé d'une introduction historique, et suivi d'une biographie des économistes*, etc. (1826); and most important of all, *Histoire de l'économie politique en Europe, depuis les anciens jusqu'à nos jours, suivie d'une bibliographie raisonnée des principaux ouvrages d'économie politique* (4th ed., 1860).

BLANQUI, LOUIS AUGUSTE (1805-81). A French revolutionist and a member of the Paris Commune. He was a brother of Jérôme Adolphe Blanqui, and was born at Puget-Théniers, in the department of Alpes-Maritimes, Feb. 7, 1805. While studying law and medicine in Paris, he became closely identified with the revolutionary movement and took an active part in the disturbances which led to the overthrow of Charles X. He became one of the most prominent leaders of the Parisian proletariat and an irreconcilable enemy of the bourgeois government of Louis Philippe. With Barbès he was the instigator of the insurrection of May 12, 1839, and as a result was condemned to death, the sentence being commuted, however, to imprisonment for life. The February Revolution set him free. He was one of the leaders of the mob which, on May 15, 1848, attempted to storm the hall of the National Assembly and was condemned to 10 years' imprisonment. Liberated in 1859, he lived in London for some time, and returning to Paris in 1861, speedily succeeded in incurring a sentence of four years' imprisonment as an instigator to riot. In 1871 he took part in the insurrection which led to the establishment of the Paris Commune, and became subsequently a member of the Communal government. After the taking of Paris by the troops from Versailles, Blanqui was sentenced to transportation to New Caledonia; but in con-

sideration of his infirmities, the aged man was sent to prison instead. He was pardoned in 1879 and died Jan. 1, 1881. With Armand Barbès, whose coadjutor he was in the events of 1839 and 1848, Blanqui stands out as the type of the fanatic reformer engendered by the French Revolution and the democratic movement of the nineteenth century. Idealist and fighter, but impractical, he was a lineal descendant of the men of 1793, who attempted to regenerate the world through terror. The sincerity of his beliefs was attested by nearly half a lifetime spent in prison. Blanqui was the author of a scientific work entitled *L'éternité dans les astres* (1872). His writings on economic subjects were published in 1855, under the title of *Critique sociale*. The name "Blanquistes" is now borne by the radical wing of the Socialist party in France. Consult Da Costa, *Les Blanquistes* (Paris, 1912).

BLANQUILLO, blan-kel'yó (Sp. whitish, dimin. of blanco, white). A fish of the family Latilidae (see TILFISID), which inhabit warm seas. A common species in southern California is the yellowtail (q.v.), but the name is most specifically applied to the reddish *Caulolatilus chrysops* of the Gulf of Mexico.

BLANTYRE. The chief town of Nyasaland Protectorate (q.v.).

BLARER. See BLAURER.

BLARNEY (Ir. *blarne*, a little field, from Gael. *blair*, *blar*, a plain). A village in Ireland, 4 miles from Cork, having a castle built in 1449 by Cormac McCarthy. Near the castle are the "Groves of Blarney" and on the summit of the castle tower is the Blarney Stone, the kissing of which is said to endow one with the gift of coaxing, wheedling, and flattering. The true stone, however, is one set into a wall, where it can be kissed only by a person held over the parapet. The name has given a noun, a verb, and a participle to the English language.

BLASCO IBÁÑEZ, bli'skó é-bá'nyáth, VICENTE (1867-). A Spanish novelist, journalist, and politician. In his youth he was politically and philosophically turbulent and was frequently arrested and condemned to imprisonment. Before 1913 he was recognized as beyond dispute the head of the younger school of novelists in Spain. Intensely interested in the social revolution, he preaches the gospel of constancy in labor on every possible occasion and with all the means at his command—through his novels, his newspaper (*El Pueblo*), and his position as Republican deputy from Valencia to the National Congress. His preaching does not degenerate, however, into mere sermonizing, and his theses are driven home by the truth and force of the circumstances portrayed. His novels immediately subsequent to *La Barraca* (1890) are not considered the equal of that powerful and gripping tale; but in later years his art seems to be improving constantly, and critics are hailing his more recent works as successive advances. Particular mention should be made of his *Sónnica la Cortesana*, wherein he essays the historical novel and depicts the glories of Saguntum in its heyday three centuries before Christ (Eng. trans. by Frances Douglas, New York, 1913). There are, besides, *La Catedral*, *El Intruso*, *La Bodega*, and *La Maja Desnuda*, which is considered by many the best novel he has written thus far. Consult F. Vézinet, *Les maîtres du roman espagnol* (Paris, 1907), and J. Fitz-

maurice-Kelly, *Chapters on Spanish Literature* (London, New York, 1908)

BLASER, blä'zër, GUSTAV (1813-74) A German sculptor. He was born in Dusseldorf and studied with Rauch at Berlin for 11 years. The years 1844-45 he passed at Rome, whence he was called to Berlin to design one of the eight marble groups adorning the Schlossbrücke, a task in which he was eminently successful. The group executed by him, and entitled "Minerva Leading a Youthful Warrior into Battle," is considered the best of the series. His subsequent works include "St Matthew, the Apostle," a statue of colossal proportions (church at Helsingfors), "The Prophet Daniel" (Royal Castle, Berlin), "Borussia" (New Museum, Berlin), the equestrian statue of Frederick William IV, on the Rhine Bridge, Cologne, "Hospitality" (National Gallery, Berlin), and busts of Emperor William I, the Empress of Russia, Von Alvensleben, Von der Heydt, Alexander von Humboldt, Rauch, Abraham Lincoln (at Washington), and many others. His work resembles that of his master, Rauch.

BLASHFIELD, EDWIN HOWLAND (1848-) One of the foremost American mural painters. He was born in New York City and educated in the Boston Latin School. From 1867 to 1870 he studied in Paris with Bonnat and was also aided by Gérôme and Chapu. From 1870 to 1881 he lived for the most part in France and Italy, also visiting Greece and Egypt. Until 1892 he was a figure and genre painter, his best-known paintings of this kind being "Christmas Bells" and "The Angel of the Flaming Sword." Since that time he has devoted himself entirely to decorative painting and ranks among the highest in this art in America. Among his best-known decorations are the cupola of the Liberal Arts Building at the Chicago Exposition (1893) and the ceiling of the grand ballroom of the Waldorf Astoria, representing "Dance" and "Music." He has been president of the Society of American Artists and is a member of the National Academy. Among his figure pieces "Christmas Bells" and the "Angel with the Flaming Sword" both of 1891, are best known, but he is chiefly noted for a large panel in the Appellate Court, New York, the great central dome of the Congressional Library at Washington, representing the "Development of Civilization," the decorations of the Baltimore courthouse, "Washington resigning his Commission" and "Lord Baltimore's Edict of Toleration." More recently he decorated the entire chancel of St Saviour's, Philadelphia, the chapel of the College of the City of New York, with a representation of the universities of the world, and two lunettes in the Senate Chamber, State Capitol of Minnesota, the courthouse in the Federal Building, Cleveland, four pendentives and the dome of the courthouse, Newark, N. J., the State Capitol at Madison, Wis., the courthouse of Youngstown, Ohio, and the State Capitol of South Dakota. He also furnished decorations for many private residences, such as the upper room of W. K. Vanderbilt, New York, and the library of G. W. Drexel, Philadelphia. For his mural decorations in the courthouse of Youngstown, Ohio, and the State Capitol of South Dakota he received the gold medal of the Architectural League in 1911.

Blashfield is an excellent draftsman, whose work is characterized by refinement of form

and elegance of composition, and more recently by soft and attractive color, but there is a certain sameness about his figures, which often lack virility, nor is his work always strictly decorative. He took a prominent part in founding the former Society of American Artists, of which he was president, he is, besides, a member of the National Academy of Design, the Society of Mural Painters, and the American Academy of Arts and Letters. In conjunction with his wife, he is widely known as an author on art subjects, among their joint works being *Italian Cities* (1900, new ed. 1913) and, aided by A. A. Hopkins, an admirable English edition of Vasari's *Lives of the Painters* (4 vols., 1897). In 1913 he published *Mural Painting in America and the Modern Tendency*.

BLA'STIUS, or BLAISE A saint and martyr of the Roman Catholic church. He was Bishop of Sebaste, in Cappadocia, when Licinius began a bloody persecution of the Christians. Blasius left the town and concealed himself in a chasm in the rocks, but his abode was discovered by the prefect, Agricola, while out hunting. The saint was conveyed to Sebaste, and as he steadfastly refused to deny Christ and worship the heathen gods, he was first tortured and then beheaded (316). All the details about his life and death are legendary. He was widely venerated in early times. The wool combers claim him as their patron, for the singular reason that he was tortured, among other instruments, with a wool comb. The practice of invoking St Blasius in cases of sore throat is said to have originated in the circumstance that, when young, he saved the only son of a rich widow from being choked by a fish bone. St Blasius's day is the 3d of February.

BLASNÁVAC, or BLASNÁVATZ, blas'ná-vats, MILIVOJE PETROVITCH (1826-73) A Serbian soldier and statesman. He was born at Blasnava (district of Krágyevatz), and studied in Berlin in 1848. Upon the outbreak of the Hungarian Revolution (1848) he joined the volunteer corps of General Kitchinn against the Hungarians and commanded the Serbian artillery until the close of the war. After the accession of Prince Michael Obrenovitch to the throne of Serbia, Blasnava was appointed colonel (1862) and Minister of War (1865), in which capacity he created a national militia of 80,000 men. After the assassination of Prince Michael (June 10, 1868), he proclaimed Milan as Prince of Serbia and maintained the public order. He was a member of the regency during the minority of Prince Milan, and upon the accession of the latter to the throne (Aug 22, 1872) was appointed president of the ministry.

BLASPHEMY (Gk. βλασφημία, blasphemía, speech or word of evil omen). At common law, the criminal offense of speaking or publishing words vilifying or ridiculing the divine Being, the Bible, the Church, or the Christian religion, with the intent to shock and insult or to pervert believers. The offense is a misdemeanor punishable by fine and imprisonment in the discretion of the court. Formerly in England the punishment might extend to banishment or the pillory, while in Scotland, as late as 1813, the death penalty might be imposed. Apart from its character as a crime, blasphemy is also a sin, punishable as such, not by the common law but by the ecclesiastical courts in England, and even in the United States, where such courts do not exist, it may still subject the

blasphemer to expulsion from a church or religious society.

Two reasons are assigned by the courts for treating blasphemy as a crime: 1. It tends to produce a breach of the peace by leading to violent altercations between the blasphemer and those who are shocked and outraged by his language. 2. Christianity is a part of the common law, and therefore blasphemy tends to subvert the law and to destroy the very foundation of civil society. Because of its offensiveness to the majority of virtuous people, and because it is considered injurious to the tender morals of the young, it is often spoken of by judges as a public nuisance, and when it is written or printed, it is deemed a libel.

Formerly any attack upon Christianity or any argument against its fundamental doctrines, as those were understood by the Established Church, amounted to the crime of blasphemy; but a different view now prevails both in England and in the United States. It is the manner rather than the matter of the utterance or publication that renders it blasphemous. Lord Chief Justice Coleridge declared in 1883, in one of the few modern cases on this subject, that "if the decencies of controversy are observed, even the fundamentals of religion may be attacked without a person being guilty of blasphemous libel." Similar views had been expressed still earlier by Chancellor Kent in New York and Chief Justice Shaw in Massachusetts. The latter had defined the crime as "a willful and malicious attempt to lessen men's reverence of God," and the former had defined it as consisting "in maliciously reviling God and religion." In line with these opinions is the following statement from a decision of the Supreme Court of Pennsylvania: "No author or printer, who fairly and conscientiously promulgates opinions with whose truths he is impressed, for the benefit of others, is answerable as a criminal. Audacious and mischievous intention is, in such a case, the broad boundary between right and wrong; it is to be collected from the offensive levity, scurrilous and opprobrious language, and other circumstances, whether the act was malicious." A sober, serious, and reverent statement of one's honest opinions, however heretical, is not at present punishable as blasphemy. Undoubtedly the provisions of the Federal and State constitutions, guaranteeing religious freedom and guaranteeing liberty of speech and the press, have helped to modify the judicial conception of this crime.

While blasphemy is still a crime in England and in most of the United States, prosecutions for the offense have become very rare. Though always punishable, it is seldom punished. In some of the United States it has ceased to be a crime. Such seems to be the case in New York.

Consult Stephen, *History of the Criminal Law of England* (London, 1883); also the *Encyclopedia of the Laws of England*, 2d ed., vol. ii, p. 202 (London, 1906); Bishop, *New Commentaries on the Criminal Law* (Chicago, 1892); and the *New York Penal Law*, Laws of 1900, chap. 40.

BLASS, bläs, FRIEDRICH WILHELM (1843-1907). A German classical scholar, born at Osnabrück, Hanover. From 1860 to 1863 he studied at Göttingen and Bonn; he then for some years taught at various gymnasia and at the University of Königsberg. He was professor in the University of Kiel from 1876 to 1892, and joined the faculty of the University of Halle in

1892. His works include: *Die Griechische Beredsamkeit von Alexander bis auf Augustus* (1865); *Die attische Beredsamkeit* (3 vols., 2d ed., 1887-98); *Ueber die Aussprache des Griechischen* (3d ed., 1888); *Plutarch, Tiberius, und Gaius Gracchus* (1875); chapters on *Hermeneutik und Kritik, Palaographie, Buchwesen, und Handschriftenkunde* in vol. i of Müller's *Handbuch* (1891); *Grammatik der neutestamentlichen Sprache* (1896); *Philology of the Gospels* (1898); *Die Rhythmen der attischen Kunstprosa* (1901); *Die Rhythmen der asiatischen und römischen Kunstprosa* (1905). He also edited for the Teubner series of classical authors the orations of Æschines, Andocides, Antiphon, Demosthenes, Dinarchus, Hyperides, Isocrates, and Lycurgus; *Bacchylides Carmina* (3d ed., 1904); *Acta Apostolorum* (1894-96); *Evangelium Lucae* (1897); Aristotle's *Ἀθῆναια Πολιτεία* (4th ed., 1904); revised Kühner's *Grammatik der griechischen Sprache* (i. i, 2, 1890-92), and was a frequent contributor to philological journals. In 1906 he produced an edition of the *Choephori* of Æschylus (q.v.).

BLAST FURNACE. See IRON AND STEEL.

BLASTING (AS. *blast*, OHG. *bläst*, a blowing; cf. OHG. *blāsan*, breath, snort, Ger. *blasen*, to blow, Eng. *blaze*, to spread a report, just like the slang *blow*). Blasting is the art of splitting, loosening, or fracturing rock, ores, and other similar material, by means of explosives applied in holes or chambers. The several operations necessary to secure this result are: (1) boring, mining, or excavating the hole in the material to be blasted; (2) charging, or inserting the explosive compound which is to perform the work; (3) tamping, or the filling up of all or part of the remaining hole with suitable material; and (4) firing, or the application of heat or electricity to cause the explosion.

The effect of an explosion is to cause a sudden development of gases which exert such a pressure when confined as to rupture, or tend to rupture, the confining walls.

There are several factors governing the effects of a blast, the more important of which are: (1) the strength of the rock, (2) the strength of the explosive and its characteristics, (3) the size and form of the chamber, and (4) the character of the fuse, tamping, etc.

Blasting is most frequently applied in mining operations.

History. Present methods of blasting are of comparatively recent date, for it was not until 1320 that gunpowder is supposed to have been invented, and almost 100 years later before it is recorded as having been put to practical use for blasting in mines. Among the ancient Egyptians, we are told by Diodorus that they made use of hand tools, wedges, etc., to loosen or break rocks of large size, supplementing this, however, by the fire-setting system. This latter consisted in the heating, by a fire, of the rock to be broken, and then suddenly chilling it with water, the rapid contraction causing the rock to split. According to Livy, Hannibal made use of the same means to clear a road when crossing the Alps into Italy.

The above methods of breaking rock were not only used by the ancients, but we find to-day the use of wedges and the combination of wedges known as the "plug and feathers" for splitting blocks of rock in quarries; in cold climates the expansion of water in freezing is employed in quarry work; compressed air, hydraulic cart-

ridges, and hmc cartridges are also used, especially in coal mines

The first record of gunpowder's application to mining is in 1613, when Martin Weigel, chief mine boss at Freiberg, Germany, is known to have employed both drilling and blasting for the excavation of ore. At first wooden plugs were used to tamp the holes, but in 1685 clay and other similar soft material was satisfactorily substituted. That blasting became, at least to some extent, quite general by 1634-44 is proved in the fact that some of the mine accounts in the Harz district show a powder expense. Not until 1670, however, was blasting introduced into England through the importation of some German miners, and it was still later, 1724, that from the same source it was brought to Sweden.

Changes and developments in the practice were slow. In 1696 narrow bore holes were substituted for wide ones, but until 1720 the boring was done by two hammers on one drill. By 1791 sand tamping had come into practice, and in 1831 the great advance had been made, by Bickford's patent, of the safety fuse. That same year Moses Shaw, of New York, took out a patent for a method of blasting several holes at the same time by means of electricity. High explosives, i. e., gun cotton and nitroglycerin, were not discovered till 1846 by Schonbein and Sobrero, and it was as recently as 1849 that Couch, of Philadelphia, made the first percussion rock drill.

Methods. The use of high or low explosives, or a mixture of both, the dimensions, location, and arrangements of holes, and the method of charging and firing will depend upon the character of the ground and the size of the product desired, such as large building blocks of broken stone for macadam. In hard, compact rock and close work, such as the driving of tunnels and shaft-sinking, high explosives such as dynamite are used. In open cut work and in "chamber blasting" large charges of low-grade powder or a mixture of dynamite and black powder are employed. In the mining of coal, hard shale, or soft rock black powder or a low-power explosive is used. Low-power explosives have a slow lifting effect resulting in comparatively coarse sizes, whereas high explosives have a quick rending action tending to fracture the rock into small pieces. For the mining of coal the United States Bureau of Mines has carried on extensive tests to determine the proper explosive to use to avoid mine explosions, and a large number of bulletins have been issued to which the reader is referred.

The diameter and depth of holes vary greatly. In tunneling and shaft sinking in hard rock, where high explosives are used, the diameter varies from $\frac{3}{4}$ to $1\frac{1}{2}$ inches, while in softer formations, where low explosives are employed, the diameter is greater. In open cut and bench work, where the ground is soft, such as iron-ore banks and large mineral deposits, holes from 4 to 10 inches are drilled, enlarged at the lower end by exploding a small charge of dynamite ("springing"), and then fired with a large charge of black powder thereby reducing the amount of drilling required per ton of material broken. This method can be carried out on a still larger scale, known as "chamber blasts," and a mountain of rock broken down with one charge. It consists of driving a small tunnel or sinking a shaft at the end of which

chambers are prepared to receive a heavy charge of explosive, after charging these chambers with low explosives with the possible addition of a small percentage of high explosive the openings are sealed with broken rock and the charge fired. Rock for the building of a dam, by the Pike's Peak Power Company, was obtained by the latter method as follows: A tunnel, 135 feet long with 70 feet of cross drifting at its face, was driven into a hill 75 feet below the apex. In the cross drifts a charge of 35,000 pounds of black powder and 144 pounds of dynamite was distributed and fired with electric exploders. The explosion broke 110,000 cubic yards of rock, equivalent to 80 per cent of the rock above the tunnel level.

The location of holes for effective results is an important consideration. In tunneling, shaft sinking, and in rock work in general, when the rock shows planes of weakness, hand-driven holes should be made as nearly perpendicular as possible to these planes. With machine drills and work of a more extensive nature the location and arrangement will depend on local conditions and must be determined by experience. In charging, the explosive should completely fill that section of the hole it occupies, and the remaining portion of the hole should be filled with tamping, this is especially true with dynamite. A slight air cushion in the hole, due to improper charging, weakens appreciably the force of the explosive. In charging with black powder the hole should first be made dry, the powder is then poured into the hole, or in case the hole is horizontal the powder may either be shoveled in paper bags, or a long spoon-like scoop may be used. A safety fuse or electric cap should be used with its lower end well buried in the powder. In charging dynamite in dry holes the paper of the cartridges, with the exception of the one carrying the firing cap, should be slit lengthwise with a knife, and after the insertion of each stick it should be pressed with a wooden hammer. In wet holes the paper on the cartridge should not be slit. Steel and iron rods should not be used for tamping, and dynamite should not be rammed, but merely pressed, in the hole. The fuse cap, or the electric detonator, is usually placed in one of the last sticks.

If a fuse is to be used, it should first be cut square across, preferable with a fuse cutter, the cap slipped over the end, and crimped with a "crimper," but not crimped between the teeth. No effort should be required to slip the cap on, as either pressing or twisting may explode it. At the other end the fuse is slit to expose the powder core for lighting with a candle flame or torch. In the driving of tunnels or shaft sinking firing with fuse is the common practice, as it permits of timing the blast of each hole or set of holes by varying the length of the fuse, certain holes can be fired first by using shorter fuses thereby relieving the burden on succeeding holes. For open cut work and where greater advantage can be derived by simultaneous explosion of charges, electric firing is resorted to. The electric detonator with varying lengths of fuse wires, depending on the depth of the hole, is used. After charging, the fuse wires from each hole are connected, right and left, with those of the adjacent holes so as to form a continuous circuit with the holes in series, the end wires of the first and last holes are then connected with "leading wires" that run to an electric battery. The final connection with

the battery should not be made until all workmen are at a safe distance.

Misfires are due to many causes, such as defective caps, short circuiting, or poor splicing, in case of electric firing; a break in the powder thread of a fuse, etc. In case of a misfire when a fuse has been used, several hours should be allowed before approaching the holes, as there is always a possibility that the flame may smoulder and slowly creep past some break in the powder thread causing an unexpected explosion. It is always dangerous to remove the tamping from a hole, and some municipalities prohibit it, requiring that a new hole be drilled at least 12 inches away from the old hole. If the tamping is to be removed, a copper or wooden spoon should be used.

The largest blast on record was that made in connection with the deepening of that part of the channel of the East River known as Hell Gate, which connects Long Island Sound with upper New York Bay. This specific blast dislodged 270,717 cubic yards of rock, and in it 42,500 cartridges, containing 240,399 pounds of the explosive rackarock and 42,331 pounds of dynamite were used. The explosive alone cost \$110,950. Of more recent date was the submarine blast of 38 tons of dynamite, which took place at Henderson's Point, Portsmouth Navy Yard, on July 22, 1905. The object of the blast was to remove a ledge of trap rock some 400 feet wide at the base and projecting into the channel, so as to make entrance to the dry dock less difficult. It was desired to excavate to a depth of 35 feet below mean low water three acres of this material; 35,000 cubic yards were successfully removed without accident, and at a total cost of \$750,000.

Perhaps the largest and most systematic blasting operations of modern engineering construction were in the excavation of the Panama Canal, especially in the removal of the rock and other material from Culebra Cut. The blasting here was on a scale commensurate with the other parts of the work, and the largest single blast was one of 40 tons of dynamite at the blowing up of Gamboa Dyke, which protected the Culebra excavation at its northerly end from the floods of the Chagres River. After the excavation of the cut was completed, 1000 holes were drilled in the dyke, and each was loaded with from 80 to 100 pounds of dynamite. On October 10, 1913, when President Wilson, in Washington, closed a circuit, this blast was exploded, and a breach was made in the dyke which enabled the water to flow into the cut. See PANAMA CANAL.

Bibliography.—For a comprehensive discussion of blasting operations, consult: Drinker, *Tunneling, Explosive Compounds and Rock Drills* (New York, 1874); for a more concise description, in Prelini, *Tunneling* (New York, 1901); Foster, *A Treatise on Ore and Stone Mining* (London, 1905; 6th ed., 1910); Bulletins of the United States Bureau of Mines or Explosives (Washington, D. C.); Gillette, *Rock Excavation, Methods and Cost* (6th ed., New York, 1904); id., *The Elements of Mining and Quarrying* (2d ed., London, 1910). See EXPLOSIVES.

BLASTOIDEA. See PENTREMITES.

BLASTOMYCO'SIS. A disease caused by a yeast fungus, the blastomyces. It is essentially a slow, indolent, but progressive pustular inflammation of the skin, especially that of the face

and hands, and causes great disfigurement when allowed to progress unchecked. In rare instances the lungs may become infected from breathing in the yeast fungi, death taking place from general septic poisoning. Before 1894, when Gilchrist (and about the same time Buschke and Busse) showed the true nature of the disease, it was confounded with syphilis, epithelioma, and lupus, which latter it resembles in many ways. The treatment consists in opening the pustules when they form, exposure to the X-rays, and the internal administration of potassium iodide.

BLATCH, HARRIET STANTON (1856-). An American reformer, daughter of Elizabeth Cady Stanton. She was born in Seneca Falls, N. Y., graduated from Vassar College in 1878, studied in Berlin and Paris, and in 1882 married Henry Blatch, an Englishman. She took a prominent part during her 20 years' residence in England in the work of the Fabian Society, of the Women's Industrial Union, and of woman's suffrage organizations. Her studies of English village life carried on with Charles Booth were embodied in a thesis for which she received a master's degree from Vassar in 1893. She carried on her mother's work in America for the improvement of the legal status of women and was chosen president of the Women's Political Union and of the League of Self-Supporting Women (founded 1907).

BLATCHFORD, SAMUEL (1820-03). An American jurist. He was born and educated in the city of New York, graduating from Columbia College in 1837, and was admitted to the bar in 1842. In 1845 he removed to Auburn, N. Y., and joined the law firm of which William H. Seward was the head, but in 1854 he returned to New York City and soon became a prominent member of the admiralty bar and a favorite counsel in patent cases. In 1854 he was appointed judge of the United States District Court for the Southern District of New York, and in 1878 United States circuit judge for the Second Circuit. His learning, courtesy, and patience and the skill which he brought to bear on the complicated patent cases that came before him for decision made him highly esteemed as a judge, and he was in 1882, by appointment of President Arthur, promoted to the Supreme Court of the United States as associate justice, where he repeated the success of his earlier judicial career. He published in 1886 a volume of *Reports of Cases of Praxis*.

BLATCHLEY, WILLIS STANLEY (1850-). An American naturalist and geologist, born at North Madison, Conn. He graduated at Indiana University in 1887; was a member of Scoville's scientific expedition to Mexico (1891), of the Arkansas Geological Survey (1890-90), and of the United States Fish Commission (1893). In 1894 he became State Geologist of Indiana, and edited vols. xx-xxv of the *Annual Reports, Department of Geology and Natural Resources of Indiana* (1895-1902). He also published *A Nature Wooing* (1902); *Orthoptera of Indiana* (1903); *Boulder Rovers* (1906); *Coloptera of Indiana* (1910); *Woodland Idylls* (1912); *The Indiana Weed Book* (1912).

BLATHWAXT, WILLIAM (c.1649-1717). An English statesman, born at St. Martins-in-the-Fields. He held in succession a number of public offices and, in November, 1688, accompanied James II and his army to Salisbury in the capacity of Secretary of War, and seems to have conducted nearly all the affairs of the

army. Owing to his linguistic attainments he became a favorite with William III, whom he accompanied on his campaign in Flanders. He was a member of Parliament almost uninterruptedly from 1685 to 1710.

BLATTIDÆ (Lat. *blatta*, cockroach, moth). A family of cursorial Orthoptera, including the ordinary cockroach. The Blattidæ are the oldest known insects, being found as fossils in the Middle Silurian of France. See COCKROACH.

BLAUBOK, blou'buk, or **BLUEBUCK** (Dutch *blaauwbok*, blue buck). A large hippopotragine antelope (*Hippotragus leucophaeus*) of South Africa, which has been extinct since 1799. At present only five mounted specimens are known, these being in the museums of Paris, Leyden, Vienna, Stockholm, and Upsala respectively. When alive, it was restricted to the southwestern corner of Cape Colony. It measured only 40 inches to the withers and had horns hardly over 20 inches in length. These were stout and swept back from the forehead in a sabre-like curve, making most effective weapons of defense. The general color was bluish gray. Closely related is the magnificent, jet-black sable antelope (*Hippotragus niger*) from the eastern Transvaal and Mashonaland northward. The sable antelope is a very dangerous animal when wounded or at bay and has often been known to kill dogs and even lions. It breeds readily in captivity and becomes very tame, so that there is no immediate danger of its extermination. The third species is the roan or equine antelope (*Hippotragus equinus*), which is found all over Africa south of the Sahara, except in the Congo forest. It is pale brown, with a parti-colored face. *Hippotragus bakeri*, or Baker's antelope (qv), is by some considered a distinct species, or again only as a subspecies of the roan.

BLAUD'S PILLS. A common ferruginous preparation, composed of iron sulphate, potassium carbonate, sugar, tragacanth, althea, and glycerin. They are given in the simple forms of anemia (qv), usually in conjunction with a laxative, to overcome their constipating effects. See IRON, MEDICINAL USES OF.

BLAUER, blou'ër, or **BLARER**, AMBROSUS (1492-1584). A German religious reformer. He was born at Constance and studied at the University of Tübingen. In 1515 he entered the Benedictine monastery at Alpirsbach, where he afterward became prior. In consequence of his advocacy of the doctrines of Luther, however, he was deposed in 1521. He then became a Protestant preacher at Constance and was sent to regulate the ecclesiastical affairs at Memmingen (1528) and Ulm (1531). In 1534 Duke Ulrich summoned him to Württemberg, where during a period of four years he introduced the principles of the Reformation into the Church, his sphere of activity embracing 62 towns and 450 villages. In consequence of his leaning toward Zwingli, however, he was, at the instigation of the extreme Lutherans, dismissed from his office. Afterward he expounded the new doctrine in Isny, Lindau, and Augsburg. In addition to numerous letters, which are valuable as historical documents, he left a number of writings bearing upon the Reformation. For his biography, consult: Keim (Stuttgart, 1860), Pressel (Elberfeld, 1861), *Briefwechsel der Bruder Ambrosius und Thomas Blauer, 1509-1587* (3 vols., Freiburg, 1900-12).

BLAUVELT, blou'vêlt, LILLIAN (1873-

) An American singer, born in Brooklyn, N. Y. She early appeared as a violinist, subsequently studied vocal music with Bouhy in Paris, and appeared at the Théâtre de la Monnaie, Brussels, in *Faust* and other operas. Afterward she sang in concert and oratorio and continued solely in those fields. Her debut in England was made in 1898 at the Queen's Hall symphony concerts. She has sung throughout Europe, in the United States, and in Canada.

BLAUW. See BLEAU.

BLAVATSKY, bla-vats'ká, HELENA PETROVNA HAHN-HAHN (1831-91). A Russian traveler and theosophist, born in Ekaterinoslav, southern Russia. She traveled widely, penetrated to Tibet, and dealt much in spiritism and the occult. In 1873 she came to the United States, where, with H. S. Olcott, she in 1875 founded the Theosophical Society. In 1879, under her direction, a branch of the society was organized at Bombay, India, and the official journal, *The Theosophist*, was established. She met numerous "adepts" in India and elsewhere, and did somewhat to popularize the content of Buddhist philosophy alike among foreigners and native Indians, but the imposture of her miraculous pretensions has been adequately demonstrated by V. S. Solovoyoff in his work, *A Modern Priestess of Isis* (trans. by W. Leaf, London, 1895), and by the investigations of the Society for Psychical Research in 1884. Although but slightly acquainted with Sanskrit, she wrote voluminously on the ancient esoteric doctrines of India. The accredited text-book of her disciples is her *Isis Unveiled* (1876), which displays the subtitle "A Master Key to the Mysteries of Ancient and Modern Science and Theology." At the time of her death she was the leader of nearly 100,000 Theosophists in England, France, the United States, and India. An abridgment of her works was edited and published by Katharine Hillard in English (New York, 1907). Consult Olcott, *Old Diary Leaves* (New York, 1895). See THEOSOPIHY.

BLAYDES, FREDERICK HENRY MARVELL (1818-1908). An English classical scholar, a descendant of Andrew Marvell. He was educated at first at St. Peter's School, York, and later had a distinguished career at Oxford. In 1843-86 he was vicar of Harringworth in Northamptonshire. During this period, as before, he devoted himself primarily to the study of the Greek dramatists, publishing many editions and papers, which were all characterized by great boldness in the handling of the text, this freedom in conjecture detracts somewhat from the value of his work. He was an honorary LL.D. of Dublin University, honorary Ph.D. of the University of Budapest, and a fellow of the Royal Society of Letters at Athens. His long array of writings includes editions, with critical notes and commentaries, of various plays of Aristophanes (1873-93), an edition of all the plays, with critical notes only (1886), editions of all the plays of Sophocles (1859-1905), editions of three plays of Æschylus (1898-1900), *Adversaria Critica in Comicoorum Græcorum Fragmentis* (1890), *Adversaria Critica in Tragicorum Græcorum Fragmentis* (1894), *Adversaria Critica in Æschylum* (1895), *Adversaria Critica in Variis Poetis Græcos et Latinos* (1898), a paper on Euripides (1901), and a paper on Herodotus (1901). His last works were *Analecta Comica Græca* (1905) and *Analecta Tragica Græca* (1906).

BLAYDON. A coal-mining town in Durham, England, on the right bank of the Tyne, 4 miles west of Newcastle (Map: England, E 2). Its municipal life is active; it owns its water supply, maintains a technical school, and has fine modern public buildings. Its principal industries are coal mining, and the manufacture of clay products, bottles, and chemical manure.

BLAZE DE BURY, blâz' de bu'rê', ANGE HENRI (1813-88). A French author. He was born in Avignon and was a son of the author Castil Blaze. In 1839 he published his first comedy in verse, *Le souper chez le commandeur*, the first of a series of contributions to the *Revue des Deux Mondes*, with which publication he was associated for 40 years. Under the influence of the Romantics he devoted himself to the study of German literature and in 1840 published his translation of Goethe's *Faust* (14th ed., 1880), a work which obtained a wide circulation. His other works on the German poets include *Ecrivains et poètes de l'Allemagne* (2 vols., 1846); *Les poésies de Goethe* (1862); *Les écrivains modernes de l'Allemagne* (1868); *Mes souvenirs de la "Revue des Deux Mondes"* (1888); *Goethe et Beethoven* (1892, posthumous). His wife, Madame PAULINE ROSE STEWART BLAZE DE BURY, was well known as a writer under the pseudonyms "Arthur Dudley" and "Maurice Flassan." She also published, under her own name, *Voyage en Autriche, en Hongrie, et en Allemagne* (1851).

BLAZONRY. See HERALDRY.

•BLEACHING (AS. *blæcan*, to grow pale, Ger. *bleichen*, to whiten; cf. *B. bleak*, Ger. *bleich*, pale, AS. *blāc*, *blæc*, pale, shining). The art of removing coloring matters from animal and vegetable substances, leaving the material uninjured but of a light or white color, so that, as in the case of fabrics, they may be readily dyed to some desired shade. The origin of bleaching is unknown, but the art is believed to have been practiced before the Christian Era, and the "fine linen" mentioned in the Bible is supposed to have been bleached. It is thought to have been practiced by the ancient Babylonians, Egyptians, and other Eastern peoples, and was for the most part applied to vegetable fabrics, such as flax, hemp, and cotton, or the cloths made from them, although the bleaching of silk has long been known in China. Originally the atmosphere and the sun's rays alone were used for bleaching, and the plan followed was to spread the cloth on a grass field called a *bleaching green*. The fabric was sprinkled with water several times a day, and after several months of exposure it became white. No improvements of importance occurred until the eighteenth century, when Holland became the principal seat of industry, and there the material was steeped in a solution of potash lye for several days and then in buttermilk for about a week, after which it was washed and bleached on the ground. The satisfactory results thus obtained led to the name "Hollands" being given to the excellent fabrics bleached in that way, while a quality of linen, much in demand, which was spread on grass fields, was called "lawn." The next improvement was the use of dilute sulphuric acid in place of buttermilk, by which the duration of the process, formerly about eight months, was reduced to one-half that time. In 1785 the remarkable bleaching properties of chlorine were discovered by Berthollet, and its application to the bleaching

of cloth soon followed. At first the chlorine was used in its gaseous state, and it was found that it destroyed color by uniting chemically with the coloring principle, thus decomposing the color; but as the chlorine also united with hydrogen of the fibre it destroyed the fabric. Subsequently javelle water, obtained by dissolving chlorine in dilute potassium hydroxide, was employed; but in 1799 the dry calcium hypochlorite, or bleaching powder, came into use and is still largely employed, although for some purposes hydrogen peroxide is now preferred.

Cotton Bleaching. When yarn and thread are bleached, the process consists in boiling the material in a dilute solution of caustic alkali and washing, then steeping in a solution of bleaching powder and washing, after which it is steeped in sulphuric acid and again washed, then heated in a soap solution with the addition of a small quantity of bluing, after which it is passed through a dumping machine consisting of wooden rollers, containing a solution of indigo, then washed and dried again. In the case of cotton cloth or calico the process is somewhat more complicated, but consists essentially in the treatment of the material in baths of lime, lye, bleaching powder, and sulphuric or hydrochloric acid, with thorough washing after each step. In bleaching, as preparatory to calico printing, the use of a caustic alkali solution and of rosin soap follows the lime boil. This is "Printer's Bleach." It should be mentioned that an electric bleaching process has been introduced, the principal feature of which is that the bleaching liquid, as hypochlorite, is obtained by passing an electric current through solutions of sodium or magnesium chloride or a combination of the two.

Linon Bleaching. The process employed for removing colors from linen is similar to that employed for cotton, although the natural impurities are greater in the flax fibre than in the cotton. These are rendered soluble by alkaline boilings, after which the coloring matters that still remain are oxidized and destroyed by baths of hypochlorites, or bleaching powder, the processes as given for cotton being repeated several times, according to the perfection of bleach desired. It is sometimes found desirable, especially when linen cloth is bleached, to introduce a step called *grassing*, which consists in exposing the material in a field to the action of air, light, and moisture for several days. It is believed that by this method the full strength of the fibre is more completely retained. There are four grades of linen bleaching—quarter, half, three-quarter, and full bleach. In linen yarns the loss of strength is estimated at 20 to 30 per cent for full bleach, and 15 per cent for half bleach, while ordinary cotton loses only about 5 per cent.

Wool Bleaching. The special feature in which this differs from the preceding methods is in the preliminary process, which is called *scouring*. Wool fibre usually contains from 30 to 70 per cent of foreign matter, consisting of dirt, and especially of fatty matters secreted by the animal, called *yolk*. This is divided into two parts: (1) "wool perspiration," which is soluble in water, and consists essentially of potassium compounds of *oleic* and *stearic* acids, thus constituting an important source of potash; and (2) a compound insoluble in water and composed of cholesterol in combination with fatty acids. The scouring process consists in dipping the loose wool into dilute

soap solutions which form emulsions with the *yolk*, or in treating the wool to the successive action of fat solvents, such as carbon disulphide or naphtha. The scouring machine is usually a long narrow trough, divided into several tanks or bowls. The first bowls are scourers, the last are rinsers. Wringers are attached to each bowl. When the wool yarn is scoured, the process is similar, although the machinery is somewhat different. Wool cloth is scoured by passing the material as an endless band through the scouring liquid and then through a pair of squeezing rollers. Even after scouring, wool cloth retains a faint yellow tint, which is then removed by bleaching. This is accomplished by the action of sulphurous acid, which is formed by burning sulphur in a closed chamber while the scoured and washed material, still wet, is suspended on poles, or the woolen material may be immersed and moved about in a solution of sulphurous acid. Hydrogen and sodium peroxides are now being used for wool bleaching. The effect is more permanent than with sulphur.

Silk Bleaching. Raw silk contains a gelatinous substance called *sericin*, or *silk glue*, which, with calcareous and other mineral matter, is removed by working the silk in a scouring solution of soap at 95° C. This process is called *stripping*. The crude material may lose as much as 30 per cent in this operation, but the average loss is 20 to 25 per cent. The bleaching process is similar to that described under *Wool Bleaching*, and consists in exposing the wet scoured silk to the action of gaseous sulphurous acid. The use of hydrogen peroxide for bleaching silk is becoming more and more extensive. The method consists in steeping the silk in a dilute solution of hydrogen peroxide, made slightly alkaline with ammonia or sodium silicate until it is sufficiently bleached. The bleaching of paper stock, as cotton and linen rags or paper, and the bleaching of straw, as well as the bleaching of animal products, as beeswax, feathers, hair, ivory, oils, and sponges, will be found described in special articles under the names of these products.

Bibliography. J. Gardner, *Bleaching, Dyeing, and Calico-Printing* (London, 1884), *Modern Bleaching and Finishing*, by a practical working bleacher (London, 1897), Engelhardt, *Hypochlorite und elektrische Bleiche* (Halle a S., 1903), and for briefer reference, Thorp's *Outlines of Industrial Chemistry* (New York, 1906), where a bibliography of bleaching and dyeing will be found, Bottler, *Modern Bleaching Agents and Detergents* (London, 1910), Hubner, *Bleaching and Dyeing of Vegetable Fibrous Materials* (London, 1912). Consult also works on dyeing.

BLEACHING POWDER, or CALCIUM HYPOCHLORITE. An important bleaching agent and disinfectant. It is a mixed salt, containing calcium chloride and calcium hypochlorite. The process for its manufacture patented by Charles Macintosh, of Glasgow, in 1799, is still largely employed and consists essentially in the absorption of chlorine by dry slacked lime. The chlorine gas has been hitherto obtained exclusively from the action of hydrochloric acid upon manganese dioxide, but electrolytic chlorine is now used extensively. The lime used is ordinary limestone calcined in any convenient kiln and then slacked with the calculated amount of water. It is spread on the floor of a stone or leaden chamber, into which the chlorine gas is

introduced. Rotating cylinders in which the lime is propelled by an endless screw, while chlorine passes through, are also used. The absorption is considered complete when a sample of the product is found to contain about 37 per cent of active chlorine. As thus obtained, bleaching powder is a white or grayish-brown powder with a strong, pungent odor of chlorine, which is, however, destroyed in time, the substance gradually undergoing decomposition.

BLEAK, or BLICK (from the pallid color of the scales). A minnow (*Alburnus alburnus*) of the family Cypripidae. It is about 6 inches long, and slender, resembling the dace, but darker on the back, with silvery sides and white fins. It inhabits in active shoals the streams of England and the Continent, spawning in May, and is much esteemed as food by anglers and as a pet in the aquarium. The silvery substance beneath the scales is used for the manufacture of artificial pearls, as in several related fishes.

BLEAK HOUSE. The title of a novel by Charles Dickens (1852-53). It exposes the interminable delays in chancery. The name is that of Mr Jarndyce's residence and is said to have been drawn from a dairy house at Broadstairs, Kent, occupied by Dickens in summer. See SUMMERSON, ESTHER.

BLEASE, COLEMAN LIVINGSTON (1868-) Governor of South Carolina. Governor Blease was born in Newberry Co., S. C., and was educated at Newberry College and at Georgetown University, receiving the degree of LL.B. from the latter institution in 1899. He was admitted to the bar in this year and practiced law at Newberry. He was a member of the State Legislature from 1890 to 1898, and of the Senate from 1904 to 1908. He was chosen Governor on the Democratic ticket in 1910 and was reelected for a second term in 1912. Governor Blease has won considerable notoriety by the stand he has taken in his messages to the Legislature against negro education and by urging a law to prevent white persons teaching negroes. In 1912 the Legislature accused him of trading in pardons and exacting tribute from illegal rum shops. At the Governors' conference held in Richmond in the first week of December, 1912, Governor Blease defended lynchings under certain conditions and announced his intention of pardoning at least 800 convicts.

BLEB (allied to Eng. *blob, blub*). A circumscribed elevation of the superficial layers of the skin which contains fluid, usually serous in character. Blebs are really large vesicles or pustules and occur in certain skin diseases, as erysipelas, pemphigus, or in burns.

BLECH, blek, LEO (1871-) A German composer and conductor. He was born in Ar-la-Chapelle, April 21, 1871. Although he began life as a business man, he devoted much time to music. After a year of study with Bargiel and Rudloff at Berlin, he returned to his native town as conductor of the municipal theatre, where he produced his first opera, *Aglaia*, in 1893, without much success. After the lukewarm reception of his second opera, *Cherubino* (1894), he temporarily abandoned composition and devoted his summer vacations from 1895 to 1898 to a course of thorough study with Humperdinck. In 1899 he accepted the post of first conductor at the German theatre in Prague. Here he achieved distinction both as conductor and composer, so that in 1906 he was called to Berlin as one of the conductors of the Royal Opera. His

two greatest successes are the one-act comic operas *Das war Ich* (Dresden, 1902) and *Versiegelt* (Hamburg, 1908), the latter of which was also heard at the Metropolitan Opera House in New York (1912). His other works are the operas *Aschenbrodel* (1905) and *Alpenkonig und Menschenfreund* (1903); three symphonic poems *Die Nonne*, *Trost in der Natur*, *Waldwanderung*; two choral works with orchestra, *Von den Engeln* and *Sommernacht*; compositions for piano, and songs. Consult E. RYCHONSKY, *Leo Blech* (Prague, 1905).

BLECHEN, blĕk'ĕn, KARL EDUARD (1798-1840). A German landscape painter. He was born at Kottbus and until his twenty-fourth year followed a commercial career. He then studied with Lutke in the Berlin Academy and engaged for three years in scenic painting for theatres. A journey to Italy in 1828-29 was notable for his art. Heretofore romantic in character and composed from studies, it now became more realistic. In 1831 he was made professor and in 1835 a member of the Berlin Academy. The principal collection of his works is in the National Gallery, Berlin, which possesses 60 paintings and studies. Of these the most important is the "Camp of the Semnones" (1828), which marked an epoch in the development of German landscape.

BLEDOW, blă'dô, LUDWIG (1795-1846). A German chess player, born in Berlin. He founded the Berlin chess school, which flourished from 1837 to 1842, and contributed greatly to the development of the game, under the direction of Bledow, Paul Rudolf von Bilgeur (q.v.), Hanstein, Nayet, Schorn, Horwitz, and Von Heydebrandt and der Lasa (called "the Pleiades"). He established the first chess paper published in Germany (1846). His arrangement of the 100 games of the Syrian master Stamma was published by Von Oppen (Leipzig, 1865). The extensive collection of chess literature which he had accumulated during his lifetime was bought by the Royal Library in Berlin.

BLEDSE, blĕd'sô, ALBERT TAYLOR (1809-77). An American metaphysician and educational author. He was born in Frankfort, Ky.; graduated at West Point in 1830, and became a lieutenant of infantry, but resigned in 1832, and was professor of mathematics successively in Kenyon College, in Miami University, and in the universities of Virginia and Mississippi. During the Civil War he was Assistant Secretary of War in the Southern Confederacy. He was a frequent contributor to periodical reviews and at the time of his death was editor of the *Southern Review* (Methodist). His published works include: *An Examination of Edwards on the Will* (1845); *Theodicy: or, Vindication of the Divine Glory* (1853; 6th ed., 1856); *An Essay on Liberty and Slavery* (1856); *Is Davis a Traitor? or was Secession a Constitutional Right previous to the War of 1861?* (1860); *Philosophy of Mathematics* (1866).

BLEEDING (hemorrhage). One of the most serious accidents that can happen to an animal, and one which constitutes a serious complication in surgical operations. As there is but a limited quantity of blood in the body (about one-tenth of the body's weight), and as the sudden escape of a large portion of it is sufficient to cause death, every one should be instructed as to the measures which experience has shown to be the most efficient for preventing a dangerous loss of blood. Bleeding may be either from a wounded artery or vein, or occur as a general oozing

from a raw surface or a mucous membrane, or the blood may escape into the surrounding tissues or into a cavity like the pleura and remain concealed.

Arterial Bleeding. This is recognized by the florid redness of the blood and by its issuing from the cut vessel in jets. If a large artery be wounded, the first gush of blood may prove fatal, but generally there are rapid and feeble pulse, frequent and irregular breathing, intense pallor; cold, moist skin, possibly nausea and vomiting, and prostration merging into unconsciousness, and the patient faints. The artery draws up within its sheath (see ARTERY); the blood, no longer impelled vigorously by the heart, clots about the wound and within the arterial tube. This clotting, favored by fainting and reduced blood pressure, constitutes natural hemostasis, and is sufficient in many cases to prevent a recurrence of the bleeding; but, as a rule, it is necessary to use surgical or other artificial means for restraining the flow of blood till adhesion (q.v.) can occur between the cut surface of the coats of the artery. The principal surgical means are: immediate pressure, which may be applied by pressing the finger tip on the place whence the blood is seen to flow, and may be kept up by pads secured with a bandage to the part; pressure on the artery above, or near the wound, which requires some knowledge of anatomy, but not more than any intelligent person may easily acquire. Thus, pressing on the inside of the arm, about midway between its front and back, will press the brachial artery (q.v.) against the bone, and arrest bleeding from wounds of the forearm and hand. Pressure on the middle of the groin with a thumb placed crosswise will control the stream of blood in the femoral artery, so that none can escape from any wound in thigh or leg below the point where pressure is made. Pressure on the course of the vessel may be effected temporarily by tying a handkerchief round the limb above where it is injured and then inserting a stick and twisting it sufficiently tight. This is the principle of the tourniquet, which was invented by Morel, a French surgeon, at the siege of Besançon in 1674. (See TOURNIQUET.) The objections to pressure as a means of arresting hemorrhage are, that it is very painful, that it includes the vein, and thereby engorges the limb with blood, and may cause gangrene if continued for any length of time. Actual cautery with the hot iron is occasionally useful in bleeding from a bone, or at some points where pressure or ligatures cannot be efficiently applied. It is the oldest method of stopping bleeding and until the eighteenth century was much in use. If used, the iron should be at a white heat, the wound pressed for an instant, and then the iron should be held in contact with the bleeding vessel. It causes an eschar or slough, with shriveling of the artery; and if the latter be small, it effectually stops the bleeding until the eschar drops off, when the vessel may be found still pervious at the wounded part, and the danger of bleeding be as great as at first. Ligature, or tying the artery, is a very old method of arresting hemorrhage and certainly the best. A ligature should be applied to each extremity of the cut artery. (See LIGATURE.) **Acupressure** (q.v.), introduced by Sir James Y. Simpson of Edinburgh, is useful in a few instances where the arteries are too brittle to permit ligation, but is now rarely employed.

Venous Bleeding. This is recognized by the dark color of the blood and its continuous flow.

Pressure is generally found sufficient to arrest it, and it should be applied directly over the wounded part. Ligatures are used somewhat as in arterial hemorrhage. Bleeding from large venous trunks, or sinuses, is controlled by packing the vessel with a gauze plug.

Capillary Bleeding. This is distinguished by oozing, with a tendency to spontaneous arrest. It is rarely dangerous, except in hemorrhage from the mucous membrane of the stomach. Water at a temperature of 116° F will arrest it, or cold, or the actual cautery. The old styptics (as alum, tannin, cobwebs, etc.) are not used by surgeons, as they cause unclean clots, which invite sepsis and secondary hemorrhage.

Parenchymatous Bleeding. This occurs in organs wherein small arteries empty directly into veins without intervening capillaries, as the spleen. Hot water, or cold, or dilute acetic acid may arrest it. Transfusion of blood from another person, or introduction of salt solution into the venous system of the patient, is very frequently a resort in severe hemorrhage. Some persons, known as "bleeders," have a congenital tendency to bleed (the hemorrhagic diathesis), if such a one have a trifling cut, or have a tooth pulled, he may bleed to death. An extract made from suppurational capsules (qv) sometimes controls this variety of bleeding. See BLOOD.

Bleeding, or Bloodletting. Blood may be drawn from a vein (phlebotomy—venesection), or from an artery (arteriotomy). The veins most commonly opened for this purpose are the median basilic (see ARTERY), but those of the lower limbs are occasionally selected. The patient should be placed sitting up in bed, as he may lose a dangerous amount of blood without showing the usual premonitory symptoms if his head be kept low. The venous return should now be obstructed by a bandage, and when the veins swell, one should be selected, and slit with a lancet. When the desired quantity has escaped, the surgeon's thumb should be placed on the cut and kept there till the bandage is removed, when a small pad of gauze, held in place by a bandage, will prevent further bleeding, and the wound will speedily heal. Phlebotomy was at one time habitually resorted to in inflammatory diseases, and even when there was no positive disease it was often done, particularly in the spring and autumn, as a hygienic precaution. It is now rarely used. Local bloodletting by means of cupping or leeches is used in certain conditions, such as pleurisy, sciatica, inflammation resulting from injury to a joint, etc. See VENESECTION.

BLEEK, bläk, FRIEDRICH (1793-1859). A German biblical scholar. He was born at Altona, Holstein, July 4, 1793, educated at the University of Kiel (1812-14), and in Berlin, under De Wette, Neander, and Schleiermacher (1814-17). In 1818 he became tutor in theology in the University of Berlin. Soon afterward he published essays on the *Origin and Composition of the Sibylline Oracles* and on the *Authorship and Design of the Book of Daniel*, in which he attracted attention by solid learning, thorough investigation, and candor of judgment. In 1823 he became professor extraordinary, and in 1829 he accepted the chair of theology in the University of Bonn, where for 30 years he labored with constantly increasing success, due to the thoroughness of his investigations, the impartiality of his judgments, and the clearness of his methods of presentation. He died suddenly of apoplexy, Sunday, Feb. 27, 1859, having given his

regular lecture on the previous day. He was among the precursors of the modern views on the Old Testament subjects, but upheld traditional opinions regarding the New Testament. His defense of the genuineness of the Gospel of St. John is regarded as one of the strongest that have yet appeared. Translated are his *Introduction to the Old Testament* (2 vols., London, 1869, reprinted 1 vol., 1875), and his *Introduction to the New Testament* (2 vols., Edinburgh, 1869), and *Lectures on the Apocalypse* (London, 1875). His great work on the Epistle to the Hebrews (3 vols., 1828-40) is untranslated. The Introductions just mentioned were published by his son from his notes (Berlin, 1880 and 1862, respectively), later so edited by Wellhausen (last ed., 1893) and Mangold (latest ed., 1886) as to make him the channel of views he certainly did not stand for while he lived.

BLEEK, WILHELM HEINRICH IMMANUEL (1827-75). A German philologist, son of the preceding. He was born in Berlin, was educated in Bonn and Berlin, and in 1855 went with Bishop Colenso to Natal. The next year he settled in Cape Town, where in 1880 he became curator of the important library of the Governor, Sir George Grey. He was distinguished for researches in the languages of Africa. His works, written chiefly in English, include *The Languages of Mozambique* (1856), *The Library of Sir George Grey* (2 vols., 1858-59), the uncompleted *Comparative Grammar of South African Languages* (2 vols., 1862-69), *Reynard the Fox in South Africa* (1864), *Handbook of African, Australasian, and Polynesian Philology* (3 vols., 1858-63), *Ueber den Ursprung der Sprache* (1868), translated into English under the title, *The Origin of Language* (1869), *Specimens of Bushman Folklore* (Eng. trans., 1911).

BLEIBTREU, blip'troi, GEORG (1828-92). A German battle painter. He was born at Xanten and studied at the Düsseldorf Academy and under Theodor Hildebrandt. He first became known through the picture entitled "Destruction of the Kiel Turner-Corps at Flensburg" (1862), which was followed by paintings descriptive of episodes of the War of Liberation and the battles of Frederick the Great. In 1858 he settled in Berlin, and in the war with Austria (1866) accompanied the Prussian army in the suite of Prince Frederick Charles. During the campaign of 1870 he was attached to the suite of the Crown Prince. His works have fine detail and broad conception. The following are a few of his best productions: "Battle of Grossbeeren" (1857), "Episode from Battle of Waterloo" (1858), "Battle of Königgrätz" (National Gallery, Berlin), "Surrender of Napoleon after Sedan", "Attack of Saxon Corps at Saint-Privat" (1880).

BLEIBTREU, KARL (1859-) A German poet, critic, and dramatist. He was born in Berlin, the son of the battle painter, Georg Bleibtreu. Educated in Berlin and London, he did editorial work for a few years, proclaiming in his *Revolution der Literatur* (1886) the modern naturalistic tendencies of the younger Berlin school of authors. These looked up to him and to Friedrich Nietzsche as rising stars of the first magnitude. In 1889 he assisted in the founding of the *Freie Bühne* in Berlin after the model in Paris. In his early works, as, for instance, his *Dies Ira, Erinnerungen eines französischen Offiziers an Sedan* (1884), he shows a remarkable talent for depicting battle scenes. He pub-

lished rapidly and extensively in many fields: the drama (*Lord Byron*, 1886; *Karma*; *Weltgericht*; etc.), lyrics (*Kosmische Lieder*, 1890), novels (*Herzica*, 1890; *Geist*; *Grossenwahn*, 1888, etc.), history (*Geschichte und Geist der europäischen Kriege unter Friedrich den Grossen und Napoleon*, 1892), military science (*Zur Geschichte der Taktik und Strategie*, 1897), literary history (*Geschichte der deutschen Litteratur*, 1911). His work shows power and individuality (often too much ego), but his literary method is hasty and uneven, so that he has left no one well-rounded and developed artistic production.

BLEICHRÖDER'S, blīk'rū-dēr-z. The banking house in Berlin established by Samuel Bleichröder (died in 1855) in 1803 and continued by his son, Gerson Bleichröder (1822-93), under whose management it has become one of the most important private banking institutions in Europe. The house of Bleichröder dates its larger influence from its numerous transactions carried on with the Rothschilds and the patronage of Bismarck. Its financial relations with the Prussian government began with the large subscriptions by Gerson Bleichröder to the building of the Prussian railroads. Financial advice and assistance were also sought from Bleichröder by the King of Prussia in 1866, and again in 1871, when the treaty of peace concluding the Franco-Prussian War was negotiated at the headquarters of the German army at Versailles. In recognition of his services, Gerson Bleichröder was elevated to the hereditary nobility in 1872. The banking business was subsequently conducted by his sons, Hans Bleichröder, Georg Bleichröder (died 1902), and his cousin Julius Leopold Selwachach (died 1898).

BLEMYES, blēm'ī-z, or **BLEMYES** (Gk. Βλέμυες, Βλῆμυες). An ancient African people living in and around the Libyan Desert. In the third century, while Egypt was under Roman rule, they made predatory incursions into that province, and Diocletian made important concessions to them. They were powerful and troublesome as late as the seventh century, and old authors tell strange stories of their savage appearance and habits. It is supposed that the Ababdeh, the Bisharin, and other tribes are their descendants.

BLENCK, blēnk, BMLL (1832-1911). A German statistician. He was born in Magdeburg and studied law and cameralistics in Berlin. In 1869 he became a member of the Royal Bureau of Statistics and in 183 director of that institution. The course reorganized by him and designed for the education of the higher government officials employed in the departments of statistics has produced excellent results. Since 1882 Blenck has been the editor of all publications issued by the Prussian Department of Statistics, in which a number of his scientific articles appeared. His independent writings include the following: *Das königlich preussische statistische Bureau beim Eintritte in sein neuntes Jahrzehnt* (1885); and *Das königliche statistische Bureau während der Jahre 1885-96* (1898).

BLENDE (Ger. from *blenden*, to blind, delude; see below), or **SPIALERITE**. A zinc sulphide that crystallizes in the isometric system and is usually found containing sulphide of iron, which gives it a dark color, in consequence of which it is familiarly known among the Cornish miners as "black-jack." It occurs both massive and crystallized and in color is black or brown, and sometimes red, yellow, or green. It is found in the Harz Mountains, in Saxony, in

Cornwall, England, and with lead ores in various localities in Missouri, Wisconsin, Iowa, and Illinois, in the United States. It is a valuable ore of zinc, and when pure contains 67 per cent of that metal. The sulphur which it contains has been used for the manufacture of sulphuric acid. The name was given to it by German miners because, while it resembled the mineral galena, it yielded no lead.

BLÉNEAU, blā'nō' (*Blanoilus*, *Blannellus*, of the Middle Ages). A village of France, situated in the department of Yonne, about 29 miles west-southwest of Auxerre. It is celebrated as the scene of a two days' battle between the Prince de Condé and Turenne (April 6-7, 1652). The first day Condé gained an advantage over Turenne's army in the latter's absence, but during the night Turenne arrived, and the next day he overwhipped the Spanish troops of Condé.

BLENHEIM, blēm'im (Ger. *Blindheim*). A village of Bavaria, 23 miles north-northwest of Augsburg (Map: Bavaria, D 4). It is memorable in connection with the great victory won by Marlborough and Prince Eugene over the French and Bavarians under Tallard, Marsin, and the Elector of Bavaria Aug. 13, 1704. The battle, however, did not actually take place here, but at a village in the vicinity called Höchstädt, about a mile north of the Danube, and is known to the Germans by that name. The French had massed their forces on their right and left wings, thinking the centre sufficiently protected by a narrow stream in front. Marlborough perceived the weak point in their line, and ordering an assault on the enemy's wings, to hide his real purpose, he with the mass of his army forded the stream, broke the French centre, took them in flank, and utterly destroyed the hostile army. Of 56,000 French and Bavarians, 14,000 were taken prisoners and 25,000 perished by the sword or in the Danube. The loss of the victors amounted to about 5000 killed and 8000 wounded. Near Blenheim the French defeated the Austrians, June 19, 1800.

BLENHEIM DOG, or **MARLBOROUGH DOG**. See SPANIEL.

BLENHEIM HOUSE. The seat of the Duke of Marlborough, erected near Oxford at the public expense in the reign of Queen Anne as a testimony of gratitude to the victor of Blenheim (q.v.). For this purpose £500,000 was voted, but that sum did not suffice for the completion of the work. The royal estate of Woodstock, in which it stands, was granted at the same time. The building was designed by Sir John Vanbrugh, and is a striking monument, combining grandeur and picturesqueness to a remarkable degree. The length of the principal front is 348 feet, with advancing wings and a projecting pier brought together with insweeping curved lines toward the centre. The interior is proportionately magnificent, and the collection of paintings is one of the most valuable in Great Britain. In the grounds are a triumphal arch, and a column 130 feet high, surmounted by a statue of Marlborough. An inscription on the pedestal, written by Bolingbroke, recites the public services of the hero. The Manor of Blenheim Park embraces a circuit of about 12 miles. Consult Taunt, *Blenheim and Woodstock* (Oxford, 1909).

BLENK, JAMES HUBERT (1856-). An American Roman Catholic archbishop, born at Edenkoben, Bavaria. He was educated at St. James College, Baltimore, and at the Jefferson College, in Convent, La. After entering the So-

cety of Mary (1874) and studying in the Irish and French Marist Houses of Study and at the Catholic University of Dublin, he was ordained a priest in 1885 and in the same year became professor at Jefferson College, of which he was president in 1890-96. He was rector of a church in Algeirs, La., in 1897-98, and in 1899, after serving as auditor to the Apostolic Delegation to Cuba and Porto Rico, was consecrated Bishop of Porto Rico. In 1906 he was made Archbishop of New Orleans.

BLENKER, blĕnk'ĕr, Louis (1812-63). A German-American soldier, born in Worms, Germany. He was one of the leaders of the German Revolutionary party of 1848, and as commander of the Freischaren (Free Corps) took Ludwigshafen (May 10, 1846), occupied the city of Worms, and made an unsuccessful attack on Landau. When the Prussian troops entered the Palatinate, he fought in several of the engagements in Baden, but after the suppression of the revolution was compelled to flee to Switzerland, whence he emigrated to the United States. Upon the outbreak of the Civil War he organized the Eighth Regiment, New York Volunteers, of which he became colonel. For his gallantry in the first battle of Bull Run he was raised to the rank of brigadier general of volunteers. In 1862 he commanded a division in western Virginia and took an active part in the battle of Cedar Keys, but soon afterward was superseded by General Sigel. He was mustered out of service March 31, 1863, and died in October of injuries sustained while with his command at Warrenton, Va.

BLANNERHASSSETT, HARMAN (1764-1831). A wealthy British emigrant to America, accidentally conspicuous through his connection with the conspiracy of Aaron Burr (qv). He was born in Hampshire, England, was educated for the law at Trinity College, Dublin, married his niece, Adeline Agnew, then only 18 years of age, in 1796, and, in consequence of the social ostracism he thus brought upon himself, broke the entail upon the extensive Blennerhassett estates and emigrated to America in 1797. In the following year he bought the island later known by his name, in the Ohio, a few miles below Parkersburg, W. Va., where he built a large mansion and amid luxurious surroundings dispensed a generous hospitality. A man of scholarly tastes, he spent much of his time in study and in the making of original experiments in the natural sciences. He was visited by Burr in 1805 and was by him involved in the ambitious schemes which within the next two years brought about their ruin. For his complicity in these schemes he was twice arrested, but was free from criminal prosecution after Burr's acquittal at Richmond. A large part of his extensive property, however, passed to his creditors. He was thereafter engaged as a cotton-planter, with little success, near Port Gibson, Miss., removed to Montreal in 1819, practiced law there until 1822, when he returned to Ireland, and, after a few uneventful and unsuccessful years, died on the island of Guernsey, Feb. 1, 1831. His wife was a woman of considerable literary talent and published *The Deserted Isle* (1822) and *The Widow of the Rocks and Other Poems* (1824). She returned to America in 1842 and presented a claim to Congress for a reimbursement of her husband's losses at Blennerhassett Island, but she died in New York before final action could be taken. Consult: Salford, *Life of Norman Blennerhassett* (Cincinnati, 1853), and also Salford

(editor), *The Blennerhassett Papers, Embodying the Private Journal of Harman Blennerhassett* (New York, 1864). An article, "The True Story of Harman Blennerhassett," by Therese Blennerhassett-Adams, in vol. lxxi of the *Century Magazine* (New York, 1901), gives for the first time, on the authority of family papers, the real cause of Blennerhassett's emigration to America, together with some details concerning the Blennerhassett family.

BLANNERHASSSETT, SIR ROWLAND (1839-1909). A British publicist and educator, born in county Kerry, Ireland, and educated at Christ Church, Oxford, and at the universities of Louvain, Munich, and Berlin. He was chosen member of Parliament as a Liberal from Galway, (1865), represented county Kerry in the House of Commons (1880-85), was an inspector of schools (1890-97), and during the period 1897-1905 was president of Queen's College, Cork. He wrote much in the reviews, chiefly on foreign topics. A strong opponent of the Pan-Germanic movement, his publication of an interview with Emperor William II, in the *Daily Telegraph* in 1908, was one of the most sensational political episodes of that year.

BLÉNORRHOËA (Gk βλέννα, blenna, thick mucous discharge + ῥοία, rhoia, a flow, flux). A term applied to an unusually copious discharge from any mucous membrane. The term is now but seldom used. In discharges called blennorrhical a mixture of epithelial scales is shed in large quantities from the mucous membrane (mucous cells) and occasionally pus cells. In blennorrhoea of the lachrymal sac, if the inner corner of the eye be pressed by the fingers, an opaque, milky fluid will appear between the lids, instead of the transparent tears which are present when the lachrymal apparatus is in health. After inflammation of the genito-urinary mucous membrane a gleet discharge frequently occurs and continues for a long period. The treatment consists in establishing a robust state of health by tonics, fresh air, and careful regimen, with astringent lotions applied directly to the mucous membrane, to lessen the secretion, and occasional caustic stimulants, as the nitrate of silver, to alter the condition of the secreting membrane. See GONORRHOËA.

BLENNY (Lat. blennius, blennius, Gk βλένιος, blennios, from βλέννα, blenna, slime, mucus). A representative of a genus (*Blennius*) of spiny-rayed fishes, remarkable for the abundance of slimy matter with which their skin is covered. Many are scaleless. The body is generally of an elongated form. They have only one dorsal fin, which, however, in many is deeply divided. They are distributed in the seas of all parts of the world. The true blennies are small fishes living in small shoals, frequenting rocky coasts, and often found in pools left dry by the tide, or even among the wet seaweeds, where they are capable of subsisting for a much longer time than that of the absence of the tide. They possess the power of using their ventral fins to aid them in moving about among rocks and seaweeds, and from this ability to move about out of the water are sometimes called lizard skipper. They are hardly edible, but are much in request for the aquarium on account of their tenacity of life and their activity. They feed chiefly on small crustaceans. Many of the Blenniidæ family retain their eggs within the oviduct until they are hatched, so that the young are produced alive and capable of seeking their own food. Compare GOBY.

BLEPH'ARITIS (Gk. βλέφαρον, *blepharon*, eyelid). A chronic inflammation of the margins of the eyelids. It is very common, particularly in children, and occurs in persons who are debilitated, with poor hygienic surroundings or uncleanly habits. It is also a result of insufficient sleep, or may follow measles, chronic conjunctivitis, or exposure to dust, smoke, or wind. Very frequently it shows the presence of errors of refraction, requiring correction by eyeglasses. The superficial form is characterized by redness, itching, soreness, and swelling of the margins of the lids, with a formation of white scales between the lashes, which are loose. There is sensitiveness to light. If ulceration occurs, the lashes are glued together by yellowish crusts, which cover the ulcers. As in the other form, the lashes fall out, but in cases with ulceration they are not replaced. Ectropion (q.v.) or trichiasis (q.v.) may follow. The affection is chronic and very obstinate, but will usually yield to treatment.

BLEPH'AROPLAST' (Gk. βλέφαρον, *blepharon*, eyelid + πλάστος, *plastos*, formed, molded; referring to the cilia; see below). In plants, a name given by Webber to certain bodies occurring in connection with the formation of the male cells of one of the Cycads (*Zamia*). The same structures have been found in other Cycads (*Cycas*, etc.), in the Maidenhair Tree (*Ginkgo*), and in various fern plants. In the Cycads two blepharoplasts appear at opposite poles of the nucleus of the cell that is to produce the two male cells, and when it divides, each male cell receives a single blepharoplast. In all cases the function of the blepharoplast is the formation of cilia, by means of which the male cells may swim. Originally spherical in form, it becomes drawn out into a narrow band, which disposes itself in a spiral against the inner surface of the wall of the male cell, and from which cilia are developed which pierce the wall. The radiations which surround the blepharoplasts, and their position at opposite poles of the nucleus, have suggested that they are concerned in the formation of the spindle which precedes cell division, but more evidence is needed before this view can be accepted. Many believe that the blepharoplast, while only a transient structure, is a genuine Centrosome (q.v.), while others contend that it is a unique organ of the cell. Homologous bodies have been described under the names "Höcker," "Körnchen," "Nebenkern," "attraction sphere," "directive sphere," and "centrosome-like body."

BLÉRÉ, blá'rá'. A town in the department of Indre-et-Loire, France, situated on the left bank of the Cher, about 15 miles east-southeast of Tours. Bléré is the entrepôt for most of the traffic on the Cher and is noted for a handsome sixteenth-century chapel. Pop., 1901, 3288; 1911, 3533. The famous castle of Chenonceaux (q.v.) is 4 miles distant.

BLERIOT, LOUIS. See **AERONAUTICS**, *Monoplanes*.

BLES, blēs, HENRI MET DE, called CIVETTA (c.1480-1550). An important Flemish painter. His real name is unknown, Bles being a nickname referring to his shock of white hair, Civetta, another used by the Italians on account of the usual presence of an owl in his pictures. Of his life nothing definite is known except that he was probably born at either Bouvignes or Dinant and lived for some time at Antwerp. Although his work was much prized in Italy, it is uncertain whether he ever visited there. His only signed painting, the "Adoration of the

Magi," is in the gallery of Munich. The Metropolitan Museum of Art possesses two paintings attributed to him—the one a beautiful triptych in an original frame, the central panel representing the "Last Supper," the wings "Abraham and Melchizedek," and the "Fall of Manna." His work is characterized by a tendency to caricature features and by excellent rendition of landscapes.

BLESBOK, blēs'bōk. An African antelope (*Alcephalus albifrons*) grouped loosely under the Dutch name "hartebeest," although not in the typical genus *Bubalis*. See **HARTEBEEST**.

BLES'INGTON, MARQUETTE, COUNTESS OF (1789-1849). An English leader of society and well known as an author. She was born Sept. 1, 1789, at Knockbrit, near Clomzel, Tipperary, Ireland, where her father, Edmund Power, was settled. At the age of 15 she was married to Captain Farmer, and shortly after his death to Charles John Gardiner, Earl of Blessington. With him she took several extensive journeys on the Continent, where, as well as in London, she gathered around her all the most distinguished men of the time. In Genoa she formed an intellectual friendship with Lord Byron and afterward resided in Paris until the death of her husband, in 1829. He left her a fortune, which enabled her to gratify her literary tastes. She held a little court of her own at her family mansion, Gore House, Kensington, a suburb in the West End of London. Her celebrated soirées were frequented by many of her distinguished contemporaries. Her subsequent connection with the Count d'Orsay (who had married Lord Blessington's daughter, by a former wife) placed her in an equivocal position as regards society, and consequently, on the accession to power of Louis Napoleon, with whom both were intimate, they left England for France, where she died in Paris, June 4, 1849. Besides editing *The Keepsake* for 10 years and doing other miscellaneous literary work, she wrote several novels and sketches of life and scenes in France and in Italy. Her most valuable production is the *Conversations with Lord Byron* (1834), which helped to place the poet in a more favorable light before his countrymen. Consult Madden, *The Literary Life and Correspondence of the Countess of Blessington* (3 vols., London, 1855), and an article by Lyndon Orr entitled "Lady Blessington and Count d'Orsay" in *Munsey's Magazine* for July, 1911.

BLES'SON, JOHANN LUDWIG URBAN (1790-1861). A Prussian military writer, born in Berlin. He entered the Pioneer Corps in 1813, served in the War of Liberation as an officer of engineers, was for some time a teacher in the military school in Berlin, and retired in 1829 with the rank of major. He wrote a number of military works, including *Beitrag zur Geschichte des Festungskrieges in Frankreich 1815* (1818); *Übersicht der Belagerungskunst* (1827); *Übersicht der Befestigungskunst* (2 parts, 1827-34); *Geschichte der Grossen Befestigungskunst* (1830).

BLEWFIELD'S. See **BLUEFIELDS**.

BLICHER, blik'ēr, STEEN STEENSEN (1782-1848). A Danish lyric poet and novelist, born at Vibum, Oct. 11, 1782. He translated *Ossian* (1807-09) and followed this with poems and novels of little importance till he began to cultivate the field of Jutland peasant stories and legends (1820), in which he excelled among Danish writers and ranks very high in the world's literature. He was a close and sensitive

observer of the comedy and tragedy of the commonplace sphere in which his pastor's life was passed and rendered his observations with sympathetic art and rare love of nature. He died at Spentrup, March 26, 1848. "The Snow Bells" and "Birds of Passage" are his best later poems. *The Knitting-Room*, a collection of poems and stories largely in Jutland dialect, is characteristic of his simple naive humor. His collected tales (*Jydske Romanzer, Nationalnoveller*, etc.) appeared 1833-36, and in 1882 under the title *Samlede noveller og skizzer* (2d ed, 20 vols, 1893-94). The collection *Gamle og nye Noveller* (7 vols, Copenhagen, 1846-47) contains a humorous autobiography. *Blücher's Poems* appeared in two volumes (1835-36), supplemented by two others (1870). Consult Kristensen and Lund, *Blücher's Liv og Gjerning* (Copenhagen, 1882), Hansen, *Blücher* (Copenhagen, 1879), Hansen, *S. S. Blücher's barndom og ungdom* (Copenhagen, 1902).

BLIDA, blé-da' A town of Algeria, 30 miles southwest of Algiers. It is beautifully situated on the borders of the fine plain of Metidja, at the base of the Atlas Mountains. The town is fortified with ramparts and towers, which command the passes of the Atlas. The streets are of modern appearance, and there are numerous mosques, churches, arcades, barracks, a military hospital, and a railway depot. The Oued-el-Kebir, through an aqueduct, supplies power to large corn mills and several factories and yields an abundant water supply to the town, which contains many fountains and irrigated gardens. Exports consist of oranges, grain, cotton, tobacco, raisins, etc. Cedar and cork trees abound in the vicinity, and copper and lead mines are worked. In 1825 and in 1867 Blida was almost destroyed by earthquakes. Pop., 1891, 11,404, 1896, 13,028, 1901, 29,469, 1911, 35,461.

BLIGH, blī, WILLIAM (1754-1817) An English admiral, celebrated in connection with the mutiny of the *Bounty*. He was born, according to his statement, at Tynant, St. Tudy, Cornwall, 1753. It is probable, however, that he was the son of John Bligh, of Tretawne, and born at Plymouth, Sept. 9, 1754. He entered the navy and as sailing master accompanied Captain Cook on his second voyage around the world (1772-74). At Otaheite the breadfruit tree was discovered, and on Dec. 23, 1787, "Breadfruit Bligh," as he had been nicknamed, was appointed commander of the *Bounty*, with orders to sail to Otaheite or Tahiti, collect breadfruit tree plants, and transport them for introduction to the West India colonies. On the way from Tahiti to Jamaica a part of the crew mutinied and forced the captain and 18 men into the ship's launch, which they cast adrift, turning their own course back to Tahiti. The captain and his companions, who had very little provisions and no sextant or map, arrived, after three months of severe hardship, at the island of Timor, a distance of 3600 nautical miles from the point where they were abandoned. To Bligh's skill and courage is due the fact that not a single life was lost. On Bligh's arrival in England a man-of-war, under Captain Edwards, was sent, at his instance, to capture the mutineers. Some of them were seized, the rest had escaped to Pitcairn Island (qv), with Fletcher Christian, the leader of the mutiny, accompanied by a number of Tahitian men and women. Their place of refuge, however, was not dis-

covered until 1808, when an American ship accidentally touched at the island. At that time drunkenness and unbridled passion had left only one of the mutineers, John Adams, remaining, who had succeeded in instilling morals and religion in the little community there. Their fortunes form the subject of a poem by Byron, entitled *The Island of Christian and his Commanders*. Bligh was again sent out to collect breadfruit trees and convey them to the West Indies, in which he was successful. In 1794, during the French Revolutionary War, Bligh commanded a ship of the line, but again exciting the disaffection of his men by his harshness, they mutinied and ran the ship into a French harbor. In 1797 he commanded the *Director* at Camperdown, when Admiral Duncan defeated the Dutch Admiral De Winter, the same year he distinguished himself by his fearlessness at the mutiny at the *Nore*. In 1801, as commander of the *Glatoon* at Copenhagen, he was personally thanked by Nelson. In 1808 Bligh was appointed Governor of New South Wales, but in his prohibition of the unlimited importation of ardent spirits his conduct was so tyrannical that the military officer of the colony summarily arrested and kept him imprisoned for over two years. The officer, Major Johnson, was subsequently cashiered. Bligh, on returning to England, was made rear admiral in 1811 and vice admiral in 1814. He died Dec. 7, 1817. For narrative, consult Bligh, *The Mutiny of the Bounty* (Philadelphia, 1790).

BLIGHTIA, blī-fī-a See **ARKE**.
BLIGHT, blīt (perhaps akin to *bleal*, pale, wan). A name applied to diseases of a number of plants and to the parasites which cause them. The term has been very vaguely and variously used, having in fact been applied to almost every disease of plants caused by the condition of the atmosphere or of the soil, the attacks of insects, parasitic fungi, etc. As now used by botanists, the term "blight" is limited to attacks of parasitic fungi and bacteria. Among the numerous plants subject to blight are the apple, pear, strawberry, tomato, potato, bean, eggplant, currant, raspberry, and grape (qv).

BLIGHT, AMERICAN See **AMERICAN BLIGHT**.
BLIGHT' BIRD A small insect-eating bird (*Zosterops oerulescens*) of New Zealand, so called because it frees fruit trees of blighting insects. See **WHITE-EYE**.

BLIND, EDUCATION OF THE In every generation of children a certain proportion, varying according to social conditions and climatic influences, are born blind or with such defective organs of sight as to become blind. With the improvements in cleanliness and in sanitary appliances at orphan asylums and houses of refuge, blindness has decreased in the United States in recent years. According to the census reports of 1900, there were about 8 blind persons in every 10,000 of the population. Most of the blind are born of the poor, and even the few who are not so born tend to sink into the dependent class. Hence, in all civilized countries, blindness and pauperism have been synonymous terms, although many of its victims are endowed with keen sensibilities and suffer more from their low social position than from their physical infirmity. The nineteenth century saw a wonderful revolution in the condition of the blind. They have emerged from a state of utter ignorance, dependence, and general wretchedness, and while many have become well-educated, independent, self-supporting citi-

zens, the condition of all has been greatly improved. For this radical change much credit is due to the blind themselves, for the eagerness with which they have taken advantage of the opportunities offered them, and for the brave and successful struggle to overcome the obstacles in their path. Since their infirmity cuts them off less than the deaf from social intercourse with the world at large, they are, as a rule, more cheerful and happy than the latter, while a tendency to conceit is doubtless attributable to the consciousness that they have had to contend with very great difficulties.

History of Institutions. The first book calling attention to the condition of the blind was published in Italy in 1646, and we find, from this time onward, an increasing interest in the subject of blindness and its effect on the human mind. Locke, Leibnitz, Condillac, Reid, and Diderot wrote upon it, and Rousseau endeavored to bring the question out of the region of abstract speculation into that of practical everyday life. Raised print had been long, though dimly, foreshadowed, and a number of blind persons had received assistance in their studies from tangible apparatus, such as raised letters and ciphering tablets, before Valentine Haüy began his work. To him, however, belongs the honor of inventing embossed books for the blind, as well as of founding in Paris, in 1785, the first school for their instruction. The Royal Academy made a report on his work in that year, and while pointing out the features which his system had in common with the agencies previously employed by individual blind persons, declared that to him alone were due their perfection, extension, and systematization. The school for the blind aroused great interest in Paris, and Louis XVI took Haüy into favor, bestowing several offices upon him. In the dark days of the Revolution Haüy and his school suffered much, but he continued his work, under great difficulties and privations, educating some pupils who became famous. Haüy's long, faithful, arduous, and fruitful labors in behalf of the sightless earned him the title of "Father and Apostle of the Blind." He published an essay on their education and continued his work in Russia and Prussia after he had been obliged to give it up in Paris.

England followed the lead of France by establishing in 1791 the School for the Indigent Blind in Liverpool, the object of which was to teach poor blind children to work at trades, to sing in church, and to play the organ. In 1793 Mr. David Miller, a blind man, and Rev. Dr. David Johnston founded the Royal Blind Asylum and School in Edinburgh, the main purpose of which was to train the blind to habits of manual labor, though in later years the directors have devoted increased attention to the intellectual development of the pupils. The Bristol Asylum for the Blind was opened in 1793, its object being to teach sightless children such handicrafts as would enable them to earn their own living. They also receive instruction in music and the English branches. The School for the Indigent Blind in London was established in 1790. Its chief object was instruction in manual labor, but a more liberal scheme of education was adopted after a time. Similar establishments were founded in Norwich, Glasgow, York, Manchester, and elsewhere. The organized efforts made in Great Britain for the relief of the blind were founded upon the idea, that as a class the blind must necessarily remain at the foot of the

social scale, forever dependent upon the more fortunate classes. Hence most of the British schools have never taken a high stand in their literary or musical training. The Royal Normal College and Academy of Music for the Blind was established in London, 1872, by an American, Mr. F. J. Campbell, a blind man, who had been educated and had taught at institutions for the blind in the United States, and who brought American teachers and methods to England. There are also in Great Britain societies for teaching the adult blind to read, and circulating libraries of books in raised type have been established in London, Brighton, and many provincial towns. The Association for Promoting the General Welfare of the Blind, which has been in operation for 50 years, supplies regular work to many at their own homes and finds employment for others in its workshops.

In most of the European institutions the prevailing idea is that what is done for the blind is in the spirit of favor and charity rather than of right and obligation. A large number of the so-called schools, especially those in Great Britain, are mere asylums, chiefly supported by annual contributions, which are made and received in the nature of alms. Even in those establishments which are endowed and supported by the governments the pupils are brought up under such influences as favor the segregation of the blind into a class by themselves and do not inspire the desire for usefulness and self-maintenance.

At the beginning of the nineteenth century institutions for the blind, mainly fashioned after the model set by Haüy, were established in various parts of Europe. The Vienna Institution was founded in 1804, Dr. Klein, a blind man, being its director for about 50 years. That of Berlin was established under the superintendence of Herr Zeune in 1806, Haüy having paved the way for it on his way to Russia. In 1808 three institutions were established—one in Amsterdam by an association of Freemasons, one in Prague by a charitable society, and one in Dresden. In 1809 Haüy put the school in St. Petersburg in operation, and Dr. Hirzel organized that of Zürich. In 1811 the Society of the Chain, an organization similar to the Freemasons, started an institution in Copenhagen, and many others were founded soon afterward. All the principal countries of Europe have special institutions for the instruction of the blind in the rudiments of learning, in music, and in mechanical arts. There are more than 150 of these on the Continent, many being under government supervision or control.

In the United States of America the education of the blind rests on a different basis. As soon as their claims to a share of the benefit of common-school learning were urged, it was conceded not as a matter of charity, but as a matter of right. The most valuable distinctive feature of the American institutions is that they constitute an integral part of the educational system of the country. The right of the blind to participate in all the educational benefits provided for every child in the Commonwealth is acknowledged by the State in its sovereign capacity, and since they cannot be taught in the common schools, an express provision is made for their instruction. This policy has acted very favorably upon the blind and has inspired them with self-respect and a worthy ambition to be independent.

The general system adopted in the American

schools is as follows (1) to give to all pupils the same sort of instruction, and to the same degree, as is given in the best public common schools, (2) to teach them the elements of vocal and instrumental music, (3) to train them in some sort of simple handicraft by which to earn a livelihood. Owing, however, to the prevailing desire of the young in America to strike out in new directions, to the general preference for brain work rather than hand work, and to the disadvantage at which the blind do mechanical work, comparatively few, hardly two-tenths, it is said, practice for a living the handicrafts which they have learned at the several institutions. Most of the graduates resort to various branches of the musical profession, teaching the elements of vocal and instrumental music, playing upon organs, tuning pianos, or trading in musical instruments. Some graduates take petty agencies and with a guide go about the country peddling on their own account. Others, favored by friends, find employment in some of the establishments where hand work combined with a certain amount of headwork is required. A few work diligently at their trades and earn an honest and comfortable livelihood. The general condition of the graduates is affected by the prevailing feeling of compassion, which, it must be said, is often abused by the blind. Upon the whole, however, the general effort made to lift the blind out of the pauper class has had very satisfactory results. There is doubtless a greater proportion of really self-supporting blind persons in the United States than in any other country. This is owing mainly to the public institutions for their education and training, especially to the pioneer school, the Perkins Institution, on which the others are modeled to a great extent, and to its director for 45 years, Dr Samuel Gridley Howe. Dr Howe, the Hero of America, possessed not only the humanity and inventive genius characteristic of the famous Frenchman, but also great executive ability.

The first school for the blind in the New World was founded in Boston, Mass., chiefly through the efforts of Dr John D. Fisher, a young physician, who had visited the French school. It was incorporated by Act of Legislature March 2, 1829, as the New England Asylum for the Blind. The State granted its aid from the beginning, this being proportioned at first to the number of beneficiaries received and educated, and active work was commenced in 1831, when Howe was engaged as director. Exhibitions of the pupils were given before the Legislature at an early date, and much interest and enthusiasm were aroused. Col Thomas H. Perkins gave his mansion in Pearl Street to the institution, which was renamed in his honor, as the Perkins Institution and Massachusetts Asylum (now School) for the Blind. The other New England States promptly took measures to secure for their blind children the advantages of instruction, but instead of erecting institutions at home, they sent their beneficiaries to the Massachusetts school.

Instruction in the literary department included not only the simple branches of a common-school education, but also some higher mathematics, astronomy and natural philosophy. The study of languages, too, was introduced at an early date, but, of course, the main emphasis was laid on a solid English education. In addition to vocal music and instruction upon the piano and

organ, the foundation for an orchestra was immediately commenced. The tuning of pianofortes, taught as a practical employment, has proved to be a lucrative one. The pianos of the public schools of Boston have been tuned and kept in repair by the blind for the past 25 years. Physical training, both in the gymnasium and out of doors, has always been insisted upon, and the pupils are gently stimulated to run about and play like other children. The Perkins Institution soon surpassed the European institutions and has long been the best school of its kind in the world. A printing press was started at an early date, and many improvements in the apparatus for the education of the blind were made. A detachment of pupils visited various parts of the country, and they were exhibited before the legislatures and people of twelve different States for the purpose of inducing them to make provision for similarly afflicted persons within their own limits. These exhibitions were so effective that "provision for the education of the blind was made in those States before the representatives of the people had time to wipe the tears from their eyes."

In 1837 Dr Howe began the education of Laura Dewey Bridgman, a child seven years old, who had become blind, deaf, and dumb from scarlet fever at the age of two. It had been supposed up to that time that a person in Laura's condition could not be taught the use of language, and Dr Howe's success elicited great interest, his reports detailing the progress of his pupil being translated into several European languages. His methods, which remain the standard ones, may be thus briefly stated. Upon articles in common use, such as spoons, forks, and keys, labels were pasted, containing their names printed in raised letters. Laura felt of these carefully and soon distinguished the difference between the crooked lines—spoon and key. Then small detached labels containing the same names were given to her, and the child, observing their similarity, laid these on the articles thus designated. The same process was repeated with all the articles she could handle. After a time the labels were cut up into their component letters, and these were arranged side by side. They were then mixed in a heap, and a sign was made to her to arrange them herself. The meaning of these exercises now dawned upon her mind, and the important step was taken. Laura's education was continued until she was 20. She learned to converse fluently in the manual alphabet, to read easily, and to write well and correctly. She studied arithmetic, algebra, geography, history, and elementary physiology. She was an expert needlewoman, could sew on the sewing machine, and knit fine lace. With Oliver Caswell and other blind deaf-mutes, Dr Howe began first with the manual alphabet, instead of with printed labels. The Perkins Institution has maintained as a specialty the teaching of blind deaf-mutes, Helen Keller having begun her education under the direction of this school.

The separation of the sexes was early insisted upon by Dr Howe, on the ground that while marriage between defectives is always unfortunate, it is especially so in the case of a class so helpless as the blind. In 1868-69 the cottage or family system was introduced, the State of Massachusetts appropriating nearly \$100,000 for cottages for the girls.

The Kindergarten for the Blind, an offshoot

of the parent institution, was founded in 1887 by Michael Anagnos, the son-in-law and successor of Dr. Howe, who has continued the policy of the latter and has greatly enlarged the work of the institution. An opportunity is thus afforded for a continuous education from the earliest stage to the gates of the college, where it is thought more desirable to have the blind mingle with the seeing than to remain segregated as a class apart.

The work of educating the adult blind in their own homes was begun in Massachusetts in 1900, the Legislature appropriating a sum of money to be expended by the Perkins Institution in this way. Several teachers were employed, and the enterprise proved so successful that the State increased its appropriation the following year. Instruction is given in reading and in several branches of handicraft, suited to the sex and the physical condition of each person. The institution places at the disposal of these outdoor pupils, free of all charge, its large library of books in embossed type of four different kinds. In this manner an attempt is made to solve the problem of educating, cheering, and rendering in a measure self-supporting and independent those who become blind after the period of childhood and youth has passed.

The first thought and purpose of building up special institutions for the instruction of the blind seem to have occurred to benevolent persons in New England, New York, and Pennsylvania almost simultaneously, but without concert. The New York Institution for the Blind was incorporated April 22, 1831, through the efforts of Dr. Samuel Akery and Mr. Samuel Wood. On March 15, 1832, Dr. John D. Russ began the education of three pupils, and, although he resigned his position in 1836, he continued to manifest much interest in the improvement of educational appliances for the blind.

The progress of the school was for some years retarded by the want of an efficient head to direct its affairs. In 1845 Mr. James F. Chamberlain was elected superintendent, and the institution entered upon an era of prosperity and advancement which has continued to this day. The excellent Pennsylvania Institution, which has grown to be among the foremost of the world, was founded in Philadelphia by the Society of Friends in 1833. Robert Vaux had for some years urged the necessity of making such a provision for the education of the blind. Julius R. Friedlander, the first principal, had had experience in European institutions for the blind and came to Philadelphia in the hope of establishing a school for their benefit. He organized the school with great care and deliberation, gave exhibitions of the attainments of his pupils before the legislatures of Pennsylvania, Delaware, and New Jersey, and obtained appropriations for the support of beneficiaries from each of these States and later from Maryland. The Ohio School for the Blind was established at Columbus in 1837. The Virginia school opened at Richmond in 1838, and that of Kentucky at Louisville in 1842. In 1910 there were 48 State Schools for the Blind with 531 instructors and 4323 pupils, of whom 419 were in kindergartens, 1317 received instruction in vocal music, 1752 in instrumental music, and 2855 were in the industrial departments. The libraries contained 80,774 volumes in raised type and 34,756 volumes in ordinary print. The value of property was reported as \$6,606,186.

In Europe Mr. Anthony Buckle, superintendent of the Yorkshire school, who died in 1900, did much for the elevation of the blind in the industrial and moral scale, as well as for their intellectual and spiritual enlightenment. The *Ecole Braille*, situated at Saint-Mandé, one of the suburbs of Paris, is administered with vigor and efficiency by Monsieur A. Péphan. It is under the control of the municipal authorities and entirely supported by the city. The *Institution Nationale* of Paris, the school founded by Haüy, is liberally supported by the state, and its pupils, selected from a large number of applicants residing in all the districts of France, are, as a rule, superior in intelligence to those of other European and of American schools. The institutions for the blind of Germany do not differ from those of France in any of the fundamental principles upon which the work is conducted. They employ a class of instructors superior to those of any other country. Few of the teachers are blind, and most of them are graduates of the German universities. The Imperial institution for the blind in Vienna now occupies a fine building, situated near the Prater, and well calculated to meet all demands for the physical, mental, moral, and spiritual development of its inmates. In addition to a commodious and well-equipped gymnasium, excellent school and music rooms, and a printing office with the necessary tools and machinery, it contains a museum, which is the best of its kind in Europe, in arrangement, classification, and proper display of its contents. It is not so rich in collections of specimens of apparatus as that of Paris. The director, Prof. Alexander Mell, is the author of the *Encyclopädisches Handbuch des Blindenwesens*—an important work on the blind and the methods and appliances employed in their instruction and training.

An international congress for the amelioration of the condition of the blind was held in Paris in connection with the Universal Exposition of 1900. Germany, England, Denmark, Sweden, Holland, Russia, Hungary, Switzerland, Italy, Portugal, the United States, Belgium, and France were represented, the two countries last named having the largest number of delegates and the controlling influence. There is an American Association of Instructors of the Blind, which meets biennially.

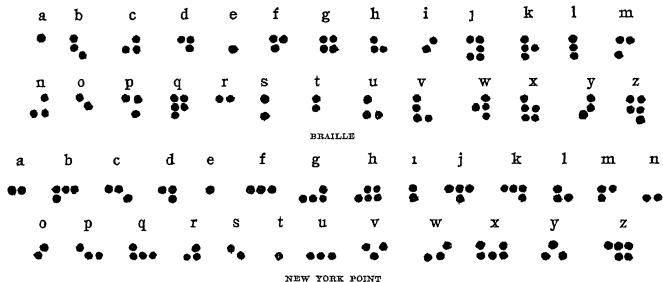
Books. In all the branches of instruction for the blind, while oral teaching is of no small importance, aid is derived from the use of books and apparatus adapted to the sense of touch. The process of printing embossed books consists of pressing the type strongly on heavy paper, in such a way as to produce letters in relief.

The first characters adopted by Haüy in 1785 were those of the Illyrian or Slavonic alphabet, doubtless on account of their square form. Large editions of a few works were printed at great expense in his system, which gave 365 letters on 50 square inches of surface. About 40 years later James Gall, a printer and publisher of Edinburgh, took up the work, being deeply impressed with the importance of putting the Bible into the hands of the blind. He printed his first book in 1827 and in 1834 published the Gospel of St. John, the first book of the Scriptures ever printed for the blind. In 1838 he printed for the British and Foreign Bible Society the Gospel of Luke and the Acts of the Apostles. His labors extended over a

period of 12 years. While at first he was obliged to contend with apathy and incredulity, much interest was eventually excited in his work in Great Britain and elsewhere. He used a modified Roman letter, choosing the lower-case alphabet in preference to capitals, whose uniformity renders them difficult to distinguish by the touch. His system gave 526 letters on 50 square inches. Meantime Dr Howe, when beginning the work of educating the blind at the Perkins Institution, found himself seriously hampered by the fact that at that time (1832) only three embossed books in English were in existence. By dint of various improvements, such as stereotyping, using thin paper expressly prepared, and reducing the size of the letters, he succeeded in cutting down the bulk of the books one-half, and the expense of printing to one-quarter of what it had been. Thus the Boston method gave 702 letters to 50 square inches, 21 editions of books being printed in a short time. A further improvement gave 1067 letters to the same space. Dr Howe was extremely desirous of giving the Bible to the blind, and in 1836 the entire New Testament was

alternately, the letters being reversed in alternate lines.

Nearly all the supposed improvements for facility in reading were made upon the idea that, as the majority of the blind are adults, all methods must be directed for their benefit—a theory which does not recommend itself to Americans, who consider the education of the young as of the first importance. Of these new methods only two have any prominence at the present time. Dr Moon's complex line type and the arbitrary point character. The former uses a combination of Roman letters with arbitrary characters, reversing the lines like Frere, but not the letters. His system is read with facility owing chiefly to its large type, measuring one-fourth of an inch. It was meant for elderly blind persons and for those whose hands are roughened by manual labor. It is well adapted for these two classes, but is too unwieldy for general use. The 64 volumes of the Moon Bible can be printed in eight volumes in Roman type. It also has the disadvantage of being illegible to seeing persons. Dr Moon has printed many books in English and in foreign languages. A



Alphabets for the blind, showing how the paper is embossed with raised dots to form the various characters. Courtesy of *Matilda Ziegler Magazine for the Blind*

printed at the Perkins Institution. Numerous text-books were also issued.

The first printing in Philadelphia (in 1833-34) gave only 200 letters to 50 square inches, and was abandoned. In 1836-37 work was resumed with an improved method giving 826 letters. John Alston was the inventor of the Glasgow system, which gave 891 letters, using capital letters, however, as did the Philadelphia type. He printed the Gospel of St Mark in 1837, the New Testament in 1838, and the whole Bible in 1840. Dr Howe finishing his task of issuing the Bible in 1843. Alston's type was too small to be legible, and his system did not stand the test of time. Mr Lucas, of the Bristol Institution, invented a system of stenographic printing, with arbitrary characters and many contractions, by which he secured largeness of type and diminished the size of the book. In 1839 a society was formed to aid Lucas in printing the Bible and teaching the blind to read on his system. As this system was phonetic, it did not teach correct spelling, which is in any event difficult for the blind to master. Mr Frere, of London, also invented a phonetic system about 1836, as well as return lines. His books are read from left to right and from right to left

society has been formed to extend his system, and the blind are taught by it in their own homes. It requires, however, special teachers.

The arbitrary point character was invented by Charles Barbier, a Frenchman, and arranged in its present form by Louis Braille, one of the blind professors at the Institution Nationale of Paris. It consists of six dots. One or more of these are placed in various positions, making 62 varieties of form. One great advantage of this character is that it can be used by the blind for writing to others in their condition. Another is that it affords an excellent method for writing and printing music. It is extensively used and is a valuable invention. Mr William B Wait, the superintendent of the New York Institution for the Blind, arranged a modification of the point system, the dots of his method being placed horizontally. The friends of the point system would be glad to abolish the Roman letter altogether, whereas the advocates of the latter are glad to avail themselves of both methods, which are taught side by side in some institutions. They point out that seeing persons use three distinct methods for their educational purposes: Roman letter for reading, script letter for writing, and an arbitrary arrangement of characters

for music. There would therefore seem to be no reason why the blind should not employ two: Roman letter for reading and the point for writing and music.

Since the time of Haüy thoughtful educators have dwelt on the importance of using seeing methods as far as possible for the instruction of the blind. The point is to rescue the sightless from segregation as a class apart and to give them as many interests as possible in common with the rest of the world. Thus, owing to the influence of Mr. Gall, the modified Roman letter was adopted by the Royal Society of Arts. In 1851 the Royal Commissioners of the Exhibition of the Works of Industry of All Nations, held in London, recommended the universal adoption of Dr. Howe's books (the Boston type). In 1872 the American Association of Instructors of the Blind passed a series of resolutions in favor of the adoption as far as practicable of seeing methods. In 1876 the London School Board, after a patient and careful examination of the arguments advanced by some of the ablest educators of the blind in England, decided to adopt the methods used by seeing children in ordinary schools. In the reports of the Perkins Institution Dr. Howe urged constantly the minimizing in every possible way the difference between the blind and the seeing. Dr. Frank Rainey, of the Texas Institution, declares that "If we use the ordinary methods, the child will think and talk like seeing persons, whereas if we use odd or extraordinary methods, it will not have the same conceptions of concrete things as we do."

A great advantage of the Roman letter over the point is that blind children can get their early training from teachers in the public school, or from their parents, under the former system, and they themselves can in turn, after they have grown up, teach seeing children, making fairly good governesses for families. The punctuation of the point system is complicated, and the omission or abrasion of one single point alters the entire letter. "Any system where frequent substitution of its characters is necessary for its perfection is essentially weak in all its parts, and is fearfully defective in that its structure depends upon position, reversion, and substitution."

The principal printing establishments in the United States are: 1. The American Printing House for the Blind at Louisville, Ky. Congress has since 1879 appropriated \$10,000 a year in support of this enterprise, the publications being distributed *pro rata* among the institutions of this country. 2. The Howe Memorial Press at the Perkins Institution, Boston, which has an endowment fund of nearly \$150,000, raised by private subscription.

The first circulating library for the blind in the United States was established at the Perkins Institution in 1882, although books had been lent to the blind free of charge before this time. Philadelphia and New York also have libraries of this sort, and departments for the blind have been instituted in the State Library of New York at Albany, and in several of the principal cities of New England.

Apparatus. Among the early appliances for writing may be mentioned the "string alphabet" invented by Messrs. Milne and Bain of the Edinburgh Asylum. It consisted of knots tied upon cord. Gall's writing stamps, which date from 1838, were much used. Saint-Clair and Gall invented processes for guiding the pencil in

an ingenious but slow and tedious way. Guldberg, of Copenhagen, also invented a method of pencil writing. The modern methods employed in the best American institutions are (1) the ordinary typewriter and (2) tablets for point writing, according to the Braille and kindred systems. This has the great advantage of being legible by the blind themselves, but is a slow process. It is gradually replaced in advanced work by the Hall-Braille writer—an adaptation of the principles of the typewriter to the printing of point characters, made by Mr. Frank H. Hall, of the Illinois Institution for the Blind. The followers of the New York point system use a similar machine called the kaleidograph, the invention of Mr. Wait, of the New York Institution. A third process consists in writing with a pencil on a grooved sheet of cardboard or aluminium, thus forming a square handwriting. This method has the advantage of extreme simplicity and cheapness and has been much used by the blind for many years.

For *arithmetic*, W. H. Taylor, of York, England, invented an octagonal ciphering board, with cells into which type may be placed in different positions to represent the digits. A modification of this board was made at the Perkins Institution and manufactured by one of its graduates.

For the study of *natural history*, relief representations of animals are employed, also stuffed specimens of birds and animals. Papier-mâché models, life-size, assist the blind in the study of anatomy, while for botany these are greatly enlarged.

The early maps for the blind were made in Europe, on boards and by hand, the process being tedious and expensive. Dr. Howe, in 1836, invented an atlas which is thought to have been the first book of maps for the blind ever made. At the present time the blind are aided in their study of geography by wooden wall maps in relief; dissected maps, also of wood, made at the American Printing House for the Blind, Louisville, Ky., and at the Perkins Institution in Boston; and embossed maps printed on paper by the British and Foreign Blind Association, London, and by Mr. Kunz, Illzach, Alsace.

All the *kindergarten* occupations, except drawing and painting or color work, are used with the blind children. In the kindergarten at Jamaica Plain, Mass., the following changes have been made in the ordinary appliances, to fit them for the use of the blind: The tables are marked out in inch squares by grooves instead of by lines. For the use of the gift representing surface, line, and point, frames 2 inches high and the length and breadth of the kindergarten tables have been prepared. These frames are stuffed with horsehair, and covered with cloth stitched in inch squares with coarse silk. The cushions thus formed are placed on the tables, and the tablet rings and half rings (having been previously drilled, two holes in each) are pinned on to the cushions. Sticks large enough to have holes drilled in them are used in place of the regular kindergarten sticks, and beads one-quarter inch in diameter are used to represent the point. By pinning the forms they make to these cushions, the children are able to examine their work with their fingers without displacing it and can thus "see" what they have accomplished. In the use of the parquetry, the circles, squares, etc., are not pasted on plain paper, as is usual in the kindergarten, but square and

oblong cards of different sizes with raised lines, forming inch squares, printed on them have been substituted. See KELLER, HELEN

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BLIND, blind, KARL (1826-1907) A German agitator and writer. He was born at Mannheim, and while a student at Heidelberg was imprisoned for his revolutionary activity. In 1848 he participated in the uprising in Baden and had to flee, wounded. The next year he joined the band of liberals headed by Struve which invaded southern Germany. He was taken prisoner and sentenced to eight years' confinement. He was, however, set free by the populace and went to Karlsruhe, whence he was sent by the provisional government as an envoy to Paris. Expelled from France, he went to Brussels, and then (1852) to London, where he found rest. There for many years he kept up his political agitation through articles in many journals and in intercourse with Garibaldi, Mazzini, Louis Blanc, and other democratic leaders, but after 1866 his writings became less revolutionary in tone, in consequence, perhaps, of the death of his stepson, who in May of that year attempted to assassinate Bismarck and committed suicide in prison. Blind published a great number of political essays and brief articles on history, mythology, and German literature. Among his works are *Fire-Burial among our German Forefathers*, *A Record of the Poetry and History of Teutonic Chantations*, *Ygdrasil*, or, *The Teutonic Tree of Existence*, and biographies of Freiherrn, Ledru-Rollin, and Francis Deák. In 1897 he contributed an autobiographical sketch to the *Conhill Magazine*, London.

BLIND'AGE (from *blind*, in the sense of invisible, making invisible, as in "blind story") A screen to shelter troops from an enemy's fire, constructed of lumber and earth, trees inclined against walls, bushes, etc., depending upon the available materials and ingenuity of construction. The effective defense of Ladysmith, Kimberley, and Mafeking, in the Boer War, 1899-1902, and the concealment of the Japanese trenches at Port Arthur (1904), was rendered largely possible by the clever construction of improvised bombproofs and shelters. See FORTIFICATION.

BLIND BEGGAR'S DAUGHTER OF BETHNAL GREEN An English ballad in two parts, of the time of Queen Elizabeth. The blind beggar has a fair daughter, Bessie, whom a knight falls in love with and marries. At the wedding feast the blind beggar turns out to be Henry, son of Sir Simon de Montfort. Day, in 1659, and Knowles, in 1834, produced dramas entitled *The Blind Beggar of Bethnal Green*, founded on this poem.

BLIND FISHES (OF CAVES) See CAVE ANIMALS.

BLIND HARRY See HARRY THE MINSTREL.
BLIND'NESS Want of sight may arise from any cause within the eye intercepting the rays of light on their way to the optic nerve, or from disease, defect, or injury of the optic nerve or optic tracts, or of the visual centres in the brain. Blindness may exist from birth or be acquired. It may be present during the day or the night and may be permanent or transient, complete or partial. *Congenital blindness* is due to deficient development of the nervous apparatus or to defect in the globe, to cataclat (qv), to defect or disease of the cornea, choroid coat, optic nerve, or retina, or to tumours. *Acquired blindness* may be due to injury of the eye or wounds of the head, or operations, or sympathetic irritation, to ophthalmia neonatorum, trachoma, diseases of the cornea, iris, choroid, or retina, to glaucoma or tumours, or to chronic disease of the kidneys, heart disease, syphilis, disease of the brain or its meninges, or of the spinal cord, certain fevers, poisoning by lead, alcohol, particularly wood alcohol, or tobacco, etc. See AMAUROSIS, AMBLYOPIA, ASTHENIOPIA, HEMERALOPIA, NYCTALOPIA, EYE, DISEASES OF THE, COLOR BLINDNESS.

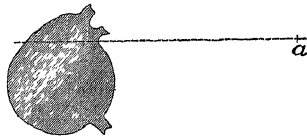
BLIND PREACHER, THE The Rev William Henry Milburn, for many years the chaplain of the United States Senate.

BLIND RIVER A town in Algoma District, province of Ontario, Canada, situated on the north shore of Lake Huron and on the Canadian Pacific Railway, 20 miles east of Thessalon (Map Ontario, A 1). It has important lumber industries. Pop, 1901, 2056, 1911, 2558.

BLIND SHELL See PROJECTILE.

BLIND SNAKE See BLINDWORM.

BLIND SPOT A roundish oval spot in each retina, which is blind. It corresponds to the place of entry of the optic nerve. The spot is some 1.8 millimeters in width, i.e., subtends an angle of some 6° (the limits given by Helmholtz are 18° 55' and 12° 25'). That it is totally



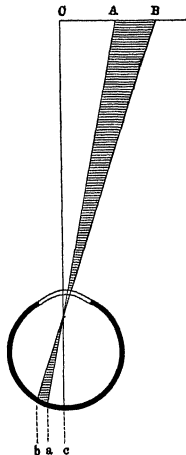
BLIND SPOT OF LEFT EYE (plane projection). Reduced from a large diagram, in which the distance from the inner edge of the point of fixation *a*, to the inner edge of the blind spot was 54.5 mm. The distance of the point of fixation from the eye in the experiment was 22 mm.

blind, whether to brightness or color, was first proved by the French physicist Mariotte in 1668 and is easily demonstrable. Its form differs somewhat in different eyes. With careful observation it can be shown to possess certain irregular prolongations, which represent the course of the large blood vessels that enter the eye along with the nerve.

A striking experiment may be performed as follows. Close or bandage the right eye, and with the left gaze steadily at a point upon a wall or screen some 7 feet distant. Let another person seat himself directly before the wall, on your left-hand side, in such a position that his

forehead is on a level with the point of gaze, and his nearer cheek some 50 centimeters distant from it. If your gaze remains constant, his face will entirely disappear, and the wall will seem to extend continuously away from you on the left. By spreading a sheet of paper on the wall, and noting the points at which a colored pencil, moved to and fro by an experimenter, disappears and reappears, you can make an accurate map of the blind spot, including the vascular prolongations mentioned above.

This experiment raises a difficulty. You fail to see the face, and yet you see something, i.e., the unbroken color of the wall. The blind spot is thus filled out with color sensation. Now in binocular vision this result might have been expected. For the optic nerve enters the eye on the nasal side of each retina; so that when we are using the two eyes together for purposes of visual perception, superposing (as it were) the one upon the other, and laying temporal half over nasal and nasal over temporal, the area that is blind in the one eye will correspond to an area in the other that is endowed with normal vision; the two eyes supplement each other. Further, the result would not be surprising, if it were gained in monocular vision, but under the ordinary conditions of seeing; for the eye is intrinsically a moving organ, and we instinctively turn the spot of clearest vision (see *EYE*) upon any object in the visual field that we wish to observe. But what of the result, in monocular vision, when we have taken especial pains to restrain the eyeball from movement?



PROJECTION OF BLIND SPOT OF RIGHT EYE.

O, optic axis; *ba*, area of optic nerve; *AB*, area of blind spot as projected on the screen *CAB*.

Let us look at the experimental data. 1. There seems to be no doubt that the spatial value of the blind spot, in visual perception, is entirely normal; points seen on the inner and outer edges of the spot do not approximate or run together,

as they would if the spot were wholly indifferent for purposes of space perception. Paste nine large letters, in three vertical columns of three letters each, upon a sheet of paper. Hold the paper at such a distance and in such a position before the eye that the central letter of the square falls within the blind spot, while the surrounding eight letters are still visible. You will find that the surrounding letters still form a square for perception; whereas, if the blind spot had no spatial function, the two letters to right and left of the central would approach each other, and the whole figure would take on an hour-glass form. 2. If the surface at which we are looking is uniformly colored, the blind spot is filled out by this color. This law was demonstrated by our first experiment. It may also be proved as follows. Paste on a sheet of paper a colored ring, large enough to contain the blind spot within it. Let the ring be so wide that the spot slightly overlaps its inner edge. You see a solid disk, of the color of the ring. 3. If the surface is checkered or variously colored, there is (for practiced observers) no filling of the spot. Paste upon a sheet of paper a rectangular cross, the two vertical arms of red and the two horizontal of blue, with the four arms mitred at the centre. Hold the paper in such a way that the centre, with its two red and two blue triangles, falls at the centre of the blind spot. At first you will think that you see the two red or the two blue arms as a continuous band of red or blue; with practice, you will be able to convince yourself that at the central point of the figure you really see nothing.

The last of these three facts is intelligible enough: if the spot is blind, it stands to reason that one does not see with it. The first two facts, however, require explanation. We may (a) attempt a peripheral theory of the phenomena; that is to say, we may assume that the retinal sensations set up in the neighborhood of the blind spot somehow "irradiate" over the spot itself. The irradiation can hardly be thought of as physical, an irradiation of the stimulus. We must rather suppose that the local signs attaching to retinal points along the edge of the spot are extensible signs, carrying with them the sense values and space values of the whole blind area. When one is required to localize a pressure upon the skin of the back, one may make a mistake of as much as 5 centimeters in any direction; the local sign is extended so far in all directions. The local signs of the particular ring of retinal tissue under consideration would be similarly extended, only that the direction of their extension (towards the centre of the spot) is limited by the structure and function of the rest of the retina. If this explanation appear far-fetched, we may have recourse (b) to a central theory; that is to say, we may assume that the blind spot is filled out by "association" or "imagination," by centrally aroused sensations (see *SENSATION*), while the periphery is and remains blind. There is no inherent difficulty in this view, and it accords well with the fact that the unpracticed observer sees the spot as filled, while the more practiced observer is aware that he does not see with it at all. We must then suppose that the local signs of the rim of the spot have taken shape under the same general laws that have conditioned visual local signs at large; and we may, perhaps, suspect that their development has been influ-

enced, in each eye, by the normal space values of the corresponding area of the other eye

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BLINDSTORY A story or other architectural horizontal division in a building, either outside or inside, which is without windows or other openings of importance in the outer walls. On the outside it may consist of a blank wall or of a series of blind arcades. On the inside of churches the term is applied especially to the middle story of the nave or choir above the side aisles and below the clearstory (qv), when without windows itself. It thus corresponds in position to the *triforium* (qv), and the term is applicable to the triforium where this is without exterior lighting. The windowless upper portion of the exterior walls of St Paul's Cathedral, London, and of the Pantheon at Paris, constitutes in each case a blindstory, masking a clearstory behind it, and in many picture galleries and museum buildings the upper story is a blindstory, the light being received through skylights in the roof.

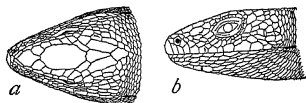
BLIND TOM (c 1850-1908) A musical prodigy, a blind and almost idiotic negro born of slave parents near Columbus, Ga., and called Thomas Bethune after his master. His musical genius attracted wide attention, and from 1861 he was frequently exhibited in New York. He was able, after a single hearing, to render even complicated music on the piano. After playing, he generally sprang up and applauded himself vociferously. He reappeared on the stage in New York in 1904-05, but he was difficult to manage, and his growing mental infirmity caused his final withdrawal, and he died in Hoboken, N. J.

BLIND WORM (Dan *blindorm*, so called on account of the small size of the eyes), or **BLIND SNAKE** A name given to certain worm-shaped burrowing reptiles and amphibians. It applies especially to those of three groups, none of which is really blind.

1 The serpent-like lizards of the family Anguillidae, of which the common blindworm, orvet, or slowworm (*Anguis fragilis*) of Europe and western Asia is a type. Both the body and tail are elongated and serpent-like and rarely more than one foot long, it possesses no external traces of appendages, but has internally a rudimentary shoulder girdle, sternum, and pelvis, placing it intermediate between the lizards, which have four legs, and the snakes, in which all traces of limbs are lost, indeed, it has been proposed to put several snake-like lizards, with more or less degenerate legs, together with some of their allies, into one group and call them serpent lizards (Saurophida). The eyes are bright, but small, giving rise to the belief that the animal is blind, and it has movable eyelids—a decidedly lizard-like character. It feeds on slugs and insects and is perfectly harmless. It is so very timid that when startled its muscles contract violently, and the tail is rendered so stiff and brittle that it is easily broken. Thus when seized by an attacking bird or mammal, the tail remains in the mouth of the assailant, while the blindworm makes its escape. Blindworms bring forth their young alive and winter together in numbers under brush and leaves or in loose, dry soil. Several genera of the same fam-

ily and presenting similar characteristics inhabit the warmer parts of America, some of which have part or all of their limbs externally developed, the beautiful green, brown-banded, many-keeled lizard (*Gerrhonotus multicarinatus*) of California is an example. In this lizard the tail is so easily detached that the creature is able voluntarily to discard this member as it scampers away. The abandoned tail twists and wiggles violently, and if it falls among dried leaves, causes such a commotion that the attention of the pursuer is very likely attracted, while the lizard keeps swiftly on its way.

Best known, however, is the "glass-snake," frequently found in the loose soil of dry fields from Illinois to Florida and westward into Mexico. It has no feet, but by serpentine movements is able to move with considerable swiftness and, when overtaken, can hardly be captured without injury, for its tail is so loosely articulated and so free of muscles that it breaks off like a bit of glass, to be quickly renewed by a new growth if the animal is not further harmed. It is yellowish green above, with black lines. "The snout is long and pointed, the ear pits large, the eyelids well developed, and each flank is provided with



"GLASS-SNAKE" LIZARD
a, top of head, b, side of head

what is ordinarily a deep groove, but which, on the animal's swallowing some large object, appears as a tract of elastic skin, the rigid skin of the body generally being incapable of expansion." It is perfectly harmless. Its technical name is *Ophisaurus ventralis*. Consult Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, Washington, 1900), and Ditmars, *The Reptile Book* (New York, 1907).

2 A family of true serpents (Typhlopidae), called "blind snakes," because their eyes in all cases are minute and weak and in some are almost invisible under overlapping plates. They rank lowest among serpents, are only a few inches in length, and have rigid bodies suitable for burrowing, shaped much like those of earthworms and with curved tails. They occur in all the warmer parts of the world, boring their way through the loose topsoil and feeding on worms, grubs, and insects, and in India sometimes appear in large numbers above ground after showers, inspiring the natives with foolish dread, for they are quite harmless. Numerous genera and species inhabit the warmer parts of America. Consult Gosse, *A Naturalist's Sojourn in Jamaica* (London, 1851).

3 The Cœlophidae, a family of degenerate urodelous amphibians for a long time classed among reptiles. The body is vermiform and without limbs, all traces even of the pelvic and pectoral girdles having been lost. The ribs are too short to encircle the body, and the vertebrae are articulated as in fishes and lower amphibia, and not as in snakes. There are small scales in the skin, the eyes are very small, and in some species are covered entirely by the skin. There is neither tympanic membrane nor tympanic cavity. • The small

mouth lies on the ventral side of the conical head, and there is no tail, for the vent opens at the posterior end of the body. All these departures from the typical amphibian type are adaptive, fitting the caecilians for their subterranean burrowing life. The young are hatched with external gills and gill slits and for a time lead an aquatic life. The caecilians inhabit warm countries and feed on earthworms and insect larvae; they are most abundant in South America, and Mexico and Ceylon possess several species. Sometimes they are called blindworms, but these amphibia should not be confused with the lizards and snakes above mentioned.

BLIRK. See BLEAK.

BLISS, CORNELIUS NEWTON (1833-1911). An American merchant and politician, born in Fall River, Mass. He was a clerk in New Orleans and subsequently in Boston, and in 1866 was admitted a partner in the commission business of J. S. & E. Wright & Co., of the latter city. In 1881 his firm was merged into that of Bliss, Fabyan & Co., of New York. He was chairman of the Republican State committees of New York of 1887 and 1888, and treasurer of the Republican National committees of 1892, 1896, 1900, and 1904. In 1897-98 he was Secretary of the Interior in President McKinley's cabinet. An attempt was made to draw him into the controversy brought about by the charges of Alton B. Parker that large contributions had been made to the Republican campaign fund by corporations of the country, but he refused to make any public statement in regard to the matter.

BLISS, DANIEL (1823-). An American missionary and educator, born in Georgia, Vt. Graduating from Amherst College in 1852 and from Andover Theological Seminary in 1855, he was ordained to the Congregational ministry and was sent (1856) to Mount Lebanon by the American Board of Commissioners for Foreign Missions. In 1862-64 he was acting secretary of this board in New York City and then returned to Syria, where he was for 38 years president of the Syrian Protestant College at Beirut. In 1902 he became president emeritus, being succeeded by his son Howard Sweetser Bliss. Frederick Jones Bliss is also his son. He published, in Arabic, *Natural Philosophy* and *Mental Philosophy* (1874).

BLISS, EDWIN MUNSELL (1848-). An American Presbyterian theologian, born in Erzurum, Turkey, a son of Isaac G. Bliss, formerly agent of the American Bible Society for the Levant. He was educated at Robert College, Constantinople (1862), and afterward at Amherst and Yale. He edited the *Encyclopedia of Missions* in 1889-91 and also the second edition (1910), was associate editor of *The Independent* in 1891-1901, and an editorial writer on *Harpers's Weekly* and the *New York Times* in 1901-02. Of the Foreign Missions Industrial Association he became general secretary in 1905 and of the Census Bureau a special agent in 1907. He published *The Turk in Armenia, Crete, and Greece* (1896); *The Missionary Enterprise* (1908).

BLISS, FREDERICK JONES (1859-). An American archaeologist, born on Mount Lebanon, Syria, son of Daniel Bliss and brother of Howard S. Bliss. He graduated at Amherst College (1880), was principal of the preparatory department of the Syrian Protestant College at Beirut for three years, and finished a course at Union Theological Seminary in 1883, but was not ordained to the ministry. After inde-

pendently conducting researches in Syria, he became associated in 1890 with the work of the Palestine Exploration Fund, and this connection was maintained for 10 years. He superintended the excavations at Tell-el-Hesi, on the site of Lachish (1891-93), and at Jerusalem (1894-97). At the former place he discovered, in 1892, the first cuneiform tablet found in Palestine—a letter from Pabî referring to Sipti Bool and Zimrida of Lachish, known from the Tell-el-Amarna tablets; at Jerusalem, with A. C. Dickie, he traced the buried ancient south rampart with remains of towers, gates, streets, etc. He assisted in placing on a firm basis the scientific study of Syrian pottery. In 1911 he became dean for men at the University of Rochester. His writings include: *A Mound of Many Cities* (1892); *Excavations at Jerusalem, 1891-97*, with R. A. S. Macalister (1898); *Excavations in Palestine, 1898-1900* (1902); *The Development of Palestine Exploration* (1906); *The Religions of Modern Syria and Palestine* (1912).

BLISS, HOWARD SWEETSER (1860-). An American Congregational clergyman and educator, son of Daniel Bliss and brother of Frederick Jones Bliss. He was born on Mount Lebanon, Syria, where his parents were Congregational missionaries; graduated from Amherst College in 1882 and from Union Theological Seminary, New York City, in 1887; studied at Mansfield College (Oxford University) and at Göttingen and Berlin and in 1890 was ordained to the ministry. He was assistant pastor of Plymouth Church, Brooklyn, until 1894, and pastor of the Christian Union Church in Upper Montclair, N. J., in 1894-1902. In the latter year he succeeded his father as president of the Syrian Protestant College in Beirut.

BLISS, TASKER HOWARD (1853-). An American soldier, born at Lewisburg, Pa., and for two years a student at the university of that city (now Bucknell University). He graduated from West Point in 1875, was professor of military science at the Naval War College from 1885 to 1888, and spent two years as military attaché at Madrid. Upon the close of the Spanish-American War, in which he had served during the Porto Rican campaign of 1898, he was appointed Collector of Customs at the port of Havana and in 1902 was made special envoy to Cuba, to negotiate the treaty of reciprocity between Cuba and the United States. He was commandant of the Army War College in 1903, from 1905 to 1909 held commands in the Philippines, in the early part of 1911 commanded the provisional brigade on the southern California border during the Mexican Insurrection, and was then for a short time commander of the Western Department. After Aug. 12, 1911, he was commander of the Department of the East. He was made brigadier general, U. S. A., in 1902.

BLISS, WILLIAM DWIGHT POMER (1856-). An American Episcopalian clergyman and social reformer. He was born in Constantinople, Turkey, and was educated at Robert College, Constantinople; Phillips Academy, Andover, Mass.; Amherst College (1878), and Hartford Theological Seminary (1882). He organized the first Christian Socialist Society in the United States in 1889, and he was president of the National Social Reform Union. He was rector at Amityville, L. I., in 1902-06, and at West Orange, N. J., in 1910. He was investigator for the United States Bureau of Labor in 1907-09.

He was editor of *The Dawn* (1889-96), of the *American Fabian* (1895-96), of the *Encyclopedia of Social Reform* (1898, rev. 1908, 3d ed., 1910), and in 1901 of the publications entitled *The Social Unity* and *The Civic Councilor*. He also published a *Handbook of Socialism* (1895) and *What is Done for the Unemployed in European Countries* (1908).

BLISS, WILLIAM JULIAN ALBERT (1867-) An American physicist, born in Washington, D. C. He graduated at Harvard in 1888 (A. B.) and received a "proficient in electrical engineering" at Johns Hopkins in 1890. He was assistant in physics at Johns Hopkins from 1895 to 1898 and associate in physics there from 1898 to 1901, when he became collegiate professor of the same subject. His publications include a *Manual of Experiments in Physics*, in collaboration with Joseph S. Ames (1897).

BLISTER BEETLE A dark-colored, elongated beetle of the family Meloidæ, so named because the dried and pulverized bodies of certain of them are used to make blister plasters. They are also called oil beetles (q. v.), because some species, as of Meleoe, exude a disagreeable yellow fluid from the kneejoints when disturbed. In the adult stage these beetles occur on foliage and flowers, especially the goldenrod, and several kinds are destructive to the potato plant. The food habits of the young are very different from those of the parent. These beetles illustrate a method of insect development termed hypermetamorphosis. (See METAMORPHOSIS.) The best-known one is the cantharis, or Spanish fly (*Lytta vesicatoria*), of southern Europe, which is bright green and about an inch long. It is gathered from its food plants—hilar, privet, etc.—at night, when at rest, by beating the bushes and catching the insects in a cloth, by persons who guard their faces with veils and gloves against the acrid volatile discharges of the beetles. They are killed usually by immersion in hot vinegar and water and then dried and put into air-tight bottles. Several other species of blister beetles are similarly used in other parts of the world.

The active principle of the blistering flies is *cantharidine*, $C_{12}H_{12}O_4$, which possesses such powerful properties that one hundredth of a grain placed on the hip rapidly causes the rise of small blisters. Administered internally, blistering flies cause heat in the throat, stomach, intestines, respiratory organs, etc., and in large doses, they give rise to inflammation of a serious nature and sufficient to cause death. Externally they are employed as a blistering agent. There are various medicinal preparations of blistering flies, such as *cerate of cantharides*, which contains 320 parts of cantharides to 180 parts yellow wax, 180 parts of resin, 220 parts of lard, and 150 parts of oil of turpentine, *tincture of cantharides*, procured by digesting blistering flies in proof spirit, etc., but that most commonly employed is *plaster of cantharides*, or *blistering plaster*, obtained by heating and straining 1000 parts of Burgundy pitch with the strained liquid. See BLISTERS, MELOIDÆ (for bibliography), and illustration on Colored Plate of BEETLES.

BLISTERS (also Old Dutch *bluyster*, blister, of *blast*, blow) Medicinal agents which, when applied to the skin, raise the cuticle into small vesicles filled with serous fluid. They are applied either in the form of plasters or in a

fluid state. The most common blister in use is made of cantharides (see BLISTER BEETLE) mixed with varying proportions of lard and wax to form an ointment. If applied too long it may produce sores which are difficult to heal. Mustard (*Sinapis nigra*) is frequently used, but seldom left on sufficiently long to produce blistering. Croton oil, strong liquor ammoniac and tartar-emetic ointment are also occasionally used in practice. Blisters are especially useful in inflammations of serous membranes, as pleurisy, in glandular tumors, in indolent ulcers, and for the relief of muscular pain, as well as for chronic joint affections. The term is also applied to elevations of the cuticle filled with serum or blood. See COUNTERIRRITANTS.

BLISTER STEEL See IRON AND STEEL.
BLITHE'DALE ROMANCE, THE Hawthorne's novel founded on the Brook Farm experiment. It is regarded by some as the finest of the author's works.

BLITONG See BILLITON.

BLIZZARD A severe, blinding storm of fine dry snow, with a freezing wind. This word is popularly said to have originated in the United States and is in fact on record there as early as 1830 or 1840, but more recent investigations have shown that it is used in analogous sense in the local dialect of Lancashire, England, where it can be traced back for several centuries and is usually spelled *blesard*. It came to be widely employed in 1880-81 in connection with the severe storms in the Western States and has been in almost universal use since the great storm of March, 1888, when snow fell to the depth of three feet over the Atlantic States and New England and was drifted by gales of wind for several days into drifts of 5, 10, and 20 feet deep, causing a general suspension of traffic. A similar storm occurred in eastern Virginia and Maryland in February, 1898, and one is also recorded for the neighborhood of Norfolk, Va., in the early part of the last century. The most destructive blizzards, because of the intense cold, occur in the region between Dakota and Missouri and Ohio. Similar storms of snow and wind are also frequent in Great Britain. These storms correspond very nearly to the *purga* of Siberia and the *buran* of Russia. They are due essentially to the rapid southward flow of a mass of cold air pushing outward from a large region of high barometric pressure. They have a well-defined front edge, which advances with great regularity, the rate of progress being by no means so rapid as that of the wind itself, whence we infer that the wind at the front must be rising upward and flowing over. The general rate of progress is therefore due, not to the wind as such, but to the differences of density and pressure prevailing in the atmosphere on either side of the front. On this account it has become possible for the officials of the United States Weather Bureau to forecast the advance of a blizzard with considerable accuracy, and very few cases occur in which the citizens are not abundantly forewarned.

BLIZZARD STATE, South Dakota. See STATES, POPULAR NAMES OF.

BLOAT (Icel *blotna*, to become soft, *blauti*, soft, wet), HOVEN, or TYMPANITES. A condition in cattle or sheep in which, owing to the formation of gas in the rumen, or first stomach, this organ becomes painfully distended. The trouble frequently occurs from eating too much, easily fermenting food, especially green feeds, such as alfalfa, clover, or other legumes. Eating un-

due quantities of grain sometimes produces the same effect. Cases of bloat are most frequent among animals that are unaccustomed to grazing on green legumes. Relief may usually be attained in mild cases by administering moderate doses of salts or medicines stimulating the removal of the contents of the rumen. One pint of linseed oil or a pound of Epsom salts would be a suitable dose for a cow and about one-fifth that amount for a sheep. If simple remedies fail, and the breathing becomes distressed, and the animal stupid, the gas may with safety be allowed to escape by an external opening made with a cannula and trochar, or with a large pocket or table knife, at a point on the left flank intermediate between the last rib, the lumbar vertebra, and the prominence of the hip joint.

BLOCH, blóg, CARL HEINRICH (1834-90). A Danish painter. He was born in Copenhagen and studied at the Copenhagen Academy. From 1852 to 1865 he was in Italy, and in 1883 he was appointed a professor at the Copenhagen Academy. He first achieved a reputation for portrait and genre pictures, the latter drawn from Jutland and Zealand. His most celebrated paintings, however, are historical and religious. The list of his works includes: "Peasant's Cottage" (1858); "Roman Street Barber" (1864); "Christian II in Prison at Sonderburg" (1871, Royal Gallery, Copenhagen); "James of Scotland Visiting Tycho Brahe," and two large historical frescoes at the University of Copenhagen. The best work of his last years is a series of small landscapes. The Royal Gallery possesses the best and largest collection of his paintings, which are good in composition but poor in color. Consult Hannover, *Danische Kunst des 19ten Jahrhundert* (Hanover, 1907).

BLOCH, JEAN DE (1830-1902). A Polish financier, economist, and writer on military affairs. He was born at Radom, of Jewish parents. He was administrator, under government appointment, of the entire railway system connecting the Black Sea and the Baltic and holder of the concessions for numerous lines. He was active in promoting an industrial movement in Poland. This he furthered by his large interests in the lumber and sugar trades, of which he became the actual head. He was constantly engaged in scientific and philanthropic enterprises among the poorer classes. He first became known to the world at large, however, as a propagandist of universal peace, partly by his articles in French, German, and English periodicals and his war-and-peace museum at Lucerne, but more particularly through his great work published at St. Petersburg in 1893 (7 vols.), and in abridged form translated into English by R. C. Long as *The Future of War in its Technical, Economic, and Political Relations* (1899; in England as, *Is War Now Impossible?*). In this book the author argues that under modern conditions a war would necessarily be of such length as to result in the starvation of the contending powers, consequent revolution, and the destruction of the state, and hence that it is unlikely to be entered upon in the future.

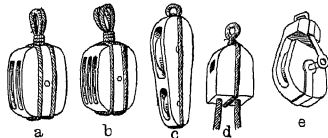
BLOCH, MARCUS ELIESER (1723-99). A German ichthyologist, born of poor Jewish parents in Anspach. He was permitted to grow up in ignorance, and at 19 he had read nothing except a few useless rabbinical treatises. He then became an assistant to a Jewish surgeon in Hamburg and learned German and Latin.

He decided to study medicine, went to Berlin, and devoted himself with indefatigable zeal to anatomy and other branches of natural history. His great work is the *Allgemeine Naturgeschichte der Fische* (12 vols., Berlin, 1872-95, with 432 colored plates), long the most comprehensive work on ichthyology, and still valuable, especially for its pictures. His collection of fishes went to the Berlin Zoological Museum.

BLOCH, MORITZ. A Hungarian philologist and theological writer. See BALLAGI, Mór.

BLOCHMANN, blóc'man, KARL JUSTUS (1786-1855). A German educator, born in Reichstädt (Saxony). He studied at the University of Leipzig and from 1809 to 1816 was an instructor in Pestalozzi's school in Yverdon, Switzerland. In 1818 he became assistant director of a newly opened school at Dresden. In 1824 he there opened, with royal sanction and support, the Blochmann Institute, a secondary school for boys, which in 1829 was united with the Vizthum Gymnasium and long enjoyed considerable fame. His method was in general similar to that of Pestalozzi. He wrote what is perhaps the best German biography of Pestalozzi. *Heinrich Pestalozzi, Züge aus dem Bilde seines Lebens und Wirkens* (Leipzig, 1846 and 1897).

BLOCK. An instrument used in practical mechanics, and especially on board ship, for changing the direction in which a rope leads or for gaining power at the expense of speed. It consists of a framework, or shell; one or more pulleys, or sheaves; a hook, shackle, or other means of attachment to other objects; a pin or pivot-bolt for the sheaves to revolve upon; and, generally, a strap or rope or iron to which the hook or shackle is attached. Blocks are classed in several ways according to the number of sheaves, as *single, double, treble, fourfold*, etc.;



BLOCKS.

a, double block; b, treble block; c, long-tackle block; d, clew-line block; e, snatch block.

according to their design, as *snatch blocks, fiddle blocks, gin blocks, secret blocks, sister blocks, cheek blocks, clump blocks*, etc.; and according to their use as *cat blocks, quarter blocks, clew-line blocks, topsail halliard blocks*, etc. The apparatus called a *tackle* or *purchase* consists of two blocks and the rope (called the *fall*) which *reeves* (i.e., passes) through them. One end of the fall, called the *standing end*, is made fast to the *breech* (the part opposite the hook) of one of the blocks; from this the fall leads through the other block and then back through the first one; if the blocks are double, treble, fourfold, etc., the fall leads back and forth through the blocks until all the sheaves are filled. See TACKLE.

BLOCK, blók, MAURICE (1816-1901). A French statistician and economist. He was born in Berlin, but was naturalized in France, where he served in the Ministry of Agriculture from

1844 to 1852 and then in the bureau of statistics till 1862, devoting himself thenceforth exclusively to authorship. Among his numerous works on agriculture in various countries of Europe, on French statistics and finances, and on socialism in Germany, the most important are *Des charges de l'agriculture dans les divers pays de l'Europe* (1850), *Dictionnaire de l'administration française* (1862), which won for him his great reputation, *Statistique de la France* (1860), *L'Europe politique et sociale* (1869), *Traité théorique et pratique de statistique* (1878), *Petit manuel d'économie pratique* (1890), which was translated into 11 languages, and *Les progrès de la science économique depuis Adam Smith* (1890). From 1856 he edited *L'Annuaire de l'économie politique et de la statistique*, and he also published several statistical works in German.

BLOCKADE (Fr. *bloquer*, to obstruct, block, bloc, block) In war, the investment by military or naval forces of an enemy's city, port, or sea-coast. A blockade may be military, in which case the object of the operation is the capture of the invested place, or commercial, for the purpose of shutting out neutral commerce from access to the blockaded port or coast.

The right to establish a blockade rests in the general right which every belligerent power possesses of distressing the enemy and weakening its power of resistance. (See **BELLIGERENT**.) As such it imposes upon neutral powers the obligation of respecting the blockade even though they may suffer loss thereby through the interruption of their commerce with the blockaded nation. But the blockading power has no right to demand from neutrals any active cooperation in maintaining the blockade, and accordingly the latter are not called upon to employ preventive measures to restrain their own subjects from violating the same. The responsibility for maintaining the blockade rests wholly on the blockading power.

Commercial Blockade—A commercial blockade is usually a naval operation conducted with the object of closing the ports of the enemy against foreign commerce.

At the commencement of such a blockade a delay is usually granted by international comity to permit neutral vessels in port to sail, which during the American Civil War was fixed at 15 days. Ten to 15 days may be considered the usual period in current practice. Neutral men-of-war on diplomatic errands and ships in distress are generally allowed entry to a blockaded port.

The rules of international law relating to blockades are a development of the last 100 years. In 1804 Prussia, in alliance with Napoleon, seized Hanover and declared her ports closed to England. The latter retaliated by proclaiming the coast from the Elbe to Brest under blockade. Napoleon in 1806 issued the Berlin Decree, laying the whole British coast under blockade. England followed with the Orders in Council putting a blockade on the coast from the Elbe to Italy. These were mere "paper blockades," as neither power could actually cover the coasts with blockading squadrons; but they served to render any neutral liable to seizure who went from an English to a continental port, or vice versa. The subsequent development of commerce and the recognition of neutral rights finally led to the Declaration of Paris in 1856, which requires that a "blockade,

to be binding, must be effective." The United States was not a party to this convention, but during the Civil War was the first power practically to enforce its rules. The Crimean War, the American Civil War, and the war between the United States and Spain for the liberation of Cuba furnished the best examples of modern blockades.

It is now a settled principle of international law that a valid blockade must fulfill the following conditions: (1) It must be ordered by the sovereign or war-making authority of the belligerent power, (2) it must be brought to the notice of the neutral powers affected by it, and (3) it must be effective. 1 As to the first condition, it is sufficient to say that a blockade ordered or instituted by the military or naval power without direct authority of the belligerent government, as by the admiral in command, at a blockaded point, is wholly void and may be disregarded with impunity. 2 Notice may be given in two ways: by diplomatic announcement to neutral powers and by a warning at the blockaded port. The French rule requires both. But the diplomatic notice, after a reasonable length of time, under modern conditions of communication, implies presumptive knowledge of the blockade on the part of all shipowners. If the blockade is raised temporarily, as by the approach of an enemy's fleet or for any other cause, excepting storms, a new diplomatic notice is necessary. 3 The rule for an effective blockade was adopted to prevent the widespread inconveniences resulting from the so-called "paper" or "cabinet" blockade. The Declaration of Paris defines an effective blockade as one "maintained by a force sufficient really to prevent access to the coast of an enemy." It requires that the evasion be made a dangerous act.

To render a capture valid an actual attempt to break an effective blockade must appear. This may be evidenced by the ship's papers, her course, or the master's instructions. The penalty for breach is confiscation of the ship and cargo. But no punishment can be inflicted upon the crew. The doctrine of "continuous voyages" requires that though a ship may touch at a neutral port, if her eventual destination is a blockaded one, she is liable. When from peace or other causes the investment ceases, the blockade must be declared raised.

The maintenance of an effective naval blockade depends primarily upon the possession of great naval superiority by the blockading force. From the standpoint of grand strategy the blockade of an enemy's coast is desirable if the enemy depends upon foreign commerce for his munitions of war, or the materials of which they are made, or if the sea affords assistance to his land operations, or for the protection of the commerce of the nation establishing the blockade. A blockade may also be desirable for the purpose of cutting off food supplies and general imports, but its importance, based on those grounds, is frequently overestimated. The importance of maintaining a blockade depends largely upon the amount of trade interrupted. If a country has a land frontier, it is manifest that this must be controlled or the blockade will be annoying only and not vitally important.

The difficulty of maintaining a blockade is at present less than it has been at any time in the history of maritime war, notwithstanding the torpedo boat—surface and submarine. The ac-

actual blockading force need be composed of light vessels only, in part of the large torpedo craft commonly called torpedo-boat destroyers. The heavier ships, especially at night, should lie farther out, beyond the easy range of torpedo-boat attack; but within supporting distance of the inner fleet should the enemy attempt a sortie in force. The maintenance of this condition depends upon the possession by the blockading power of a base in the enemy's territory where coal and supplies may be taken on board, or where at least there may be found a safe anchorage and refuge for the smaller ships in case of very heavy weather. During the continuance of such weather the heavy ships can move farther in, replacing the lighter ones which have been compelled to leave station, so that the blockade is not broken.

The most perfect blockade of a long coast was that maintained by the United States navy during the Civil War. The conditions were as favorable as can ever be expected. The South possessed a long land frontier, but except along the Mexican border it was dominated by the United States forces. The Federal navy held several bases in the enemy's territory and could have had others had it been deemed necessary. As the South had almost no seagoing naval force, many of the blockading ships were lightly armed merchantmen commissioned as auxiliaries. Blockading fleets will always be largely composed of such craft if the extent of blockaded coast is great, because no nation has a sufficient number of regular warships available for such duty, and for stopping merchant vessels such auxiliary ships are quite as good as more powerfully armed and better protected ships. One of the closest blockades ever maintained was that of Santiago by the fleet under Admiral Sampson during the Spanish War. Seven of the heaviest ships in the navy lay in a semicircle about the entrance to the harbor, about 2000 yards apart, and from 4000 to 6000 yards from the entrance. In addition to these there were several cruisers, auxiliary yachts, and torpedo boats. At night auxiliary cruisers and steam launches patrolled the entrance, which was lighted up by search lights of one of the battleships. Not even a skiff could have left the harbor unobserved.

The establishment of a blockade of the enemy's coast protects a country's commerce because it prevents, or tends to prevent, the fitting out of cruisers to prey upon it. But the war against commerce—what the French call the *guerre de course*—is becoming of less and less importance. The capture of merchant vessels has never seriously affected the result of a war, and the operations of "commerce destroyers" are likely to be attended with difficulties. It is no longer possible for them to keep the sea for long periods, as their radius of action is limited by their coal supply. Furthermore, merchant vessels of belligerents are likely to be transferred to neutral flags if the insurance rates rise unduly through greatly increased danger of capture. And, lastly, the tendency of modern warfare is towards increased exemption of private property from capture. See DECLARATION OF LONDON.

Military Blockade.—A military blockade is designed to shut off an enemy from his source or base of supplies, make him ineffective, and eventually force him to surrender through lack of food, water, ammunition, or other supplies. It

is not a regular siege, in the sense that organized efforts are made to take the base by assault; neither is it necessarily accompanied by a regular bombardment, though it may be subject to such intermittently. The military blockade, from the point of international law, does not occupy so important a place as the naval operation.

Pacific Blockade.—While apparently a contradiction in terms, a blockade being essentially a military or naval operation and therefore on its face an act of war, the pacific blockade has apparently established itself as a legitimate means of coercing a weak power to observe its international obligations without resorting to war for that purpose. It is a modern development and has usually been the act of several Powers acting in concert. It was first employed in 1827, when the combined fleets of Great Britain, France, and Russia blockaded a portion of the Turkish coast. Recent instances of its exercise were the blockade of Crete by the Powers in 1897, the blockade of Venezuelan ports by Great Britain, Germany, and Italy in 1902 and of Turkish ports by the Powers in 1905. The essentially pacific character of such a blockade is evidenced by the rules governing its exercise adopted by the Institute of International Law. These are as follows: (1) vessels under a foreign flag may freely enter in spite of the blockade; (2) a pacific blockade must be officially declared and notified and must be maintained by a sufficient force; and (3) vessels of the blockaded power which do not respect the blockade may be sequestered. The blockade having ceased, they must be restored with their cargoes to their owners, but without compensation for the detention.

While these rules are not binding on the Powers, they are in accord with the best practice and are likely to be followed in the future. See INTERNATIONAL LAW, and the authorities there cited.

BLOCK BOOKS. See PRINTING.

BLOCK COAL. A name given to certain noncoking bituminous coals of Ohio and Indiana, on account of the cube-like forms into which they break. See COAL.

BLOCKHOUSE. A temporary military fortification, usually made of logs banked with earth and surrounded by a stockade. Its construction will depend largely on the service it is intended for, the country in which it is used, the troops occupying it, and the material available. Blockhouses were extensively used in the American Civil War of 1861-65; for instance, to protect the long line of communications of Sherman's army in the Atlanta campaign. The Spaniards, during the closing years of their occupation of Cuba, adopted them extensively, notably along the line of the "Trocha." The vastness of the theatre of operations in the British-Boer War of 1899-1902, and the extreme mobility of the Boers, compelled the British to secure all cleared country by an extensive system of blockhouses, built at intervals of from 600 to 1000 yards, and connected when possible by wire entanglements. Such defenses can be made more or less strong and defensible, depending on time and conditions. See FORTIFICATION.

BLOCK ISLAND. An island in the Atlantic, 10 miles south of the Rhode Island shore and northeast of Long Island (Map: Rhode Island, B 5). It is about 8 miles long and from

2 to 4 miles wide, forming the town of New Shoreham, Newport Co, R I, well known as a popular summer resort. There are lighthouses on the northern and southeastern extremities. The island was named by Adriaen Block, who visited it in 1614, was first settled in 1662 and was captured by French privateers in 1689. In 1720 a ship bearing emigrants from the Palatinate was wrecked here, and this, together with the occasional appearance of an *ignis fatuus* off-shore, gave rise to the legend which forms the subject of Whittier's "The Palatine" and of Dana's "The Buccaneers." Pop., 1890, 1320, 1900, 1396, 1910, 1314. Consult Livermore, *A History of Block Island from 1614 to 1876* (Hartford, 1877).

BLOCK PRINTING See PRINTING

BLOCKSBURG, blocks'berk (corrupted, in German popular speech, from *Brocksberg*, the Brocken Mountain). A name given to various mountains and hills in Germany, but preeminently to the Brocken, 3745 feet, the highest point of the Harz Mountains, and indeed, of the north of Germany (Map Germany, D 3). In old legend it is the favorite haunt of the witches, where they celebrate the night of the first of May, *Walpurgisnacht* (see *WALPURGA*), with wild orgies. Almost all mountains thus haunted have been famous as places of sacrifice in the ages of paganism. See *BROCKEN*.

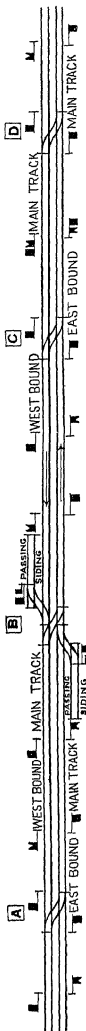
BLOCK-SIGNAL SYSTEM A method in use on railways to insure increased safety by keeping trains a certain distance apart, by dividing the line into blocks or sections, the entrances to which are guarded by appropriate signals for the government of the train. The blocks may be of any reasonable length, depending upon the physical characteristics of the line and the frequency with which the trains are run. On lines of heavy traffic the blocks are often only several hundred yards long, while on lines with a light traffic they may be three miles in length. The block systems used in modern railway practice are (1) The manual, (2) the controlled manual, which includes the staff, and (3) the automatic. In manual blocking the signals at the entrance to each block are operated and controlled by the signalman at that station. In controlled manual-block systems the signals at the entrance of each block are controlled either electrically or mechanically by the signalman in the next station ahead, but are operated by the signalman at the entrance to the block, or the signals are operated as in the manual or controlled manual systems, but are placed in the danger position automatically by the train after the rear car passes them. In train-staff blocking a special machine is located at the entrance to each block which contains a number of train staffs. The engine driver receives one of these staffs upon approaching the block, and until this staff is carried to the next block and inserted in the machine there, no more staffs can be taken from either machine. The control between the two machines is maintained by electricity. In the automatic system the operation of the signals is entirely automatic, generally through the agency of electricity or a combination of electricity and compressed air, and no signalmen are required. With any of these systems either absolute blocking or permissive blocking may be practiced. In absolute blocking two trains are never allowed to be in the same block at the same time. In permissive blocking a second train may be allowed after a certain time has

elapsed to enter a block before the first train has left it, the second train being compelled to run at decreased speed and observe caution.

The accompanying diagram shows a double-track railway arranged with block signals. The blocks are the spaces between A—B, B—C, and C—D. At A, B, and C there are signal stations, with three signals for each track. These signals are an advance signal, a distant signal, and a home signal. Should all these signals be at safety, the train passes the station into the next block, but should the home signal be at danger the train stops. The advance and distant signals are simply to show the engine driver the condition of the next home signal sufficiently in advance to permit him to slow up his train ready for a stop should it be at danger.

There are various types of signals in use in the United States. The present standard is the semaphore arm, and the principal other types are the disk signal, improperly called the banjo signal, and the revolving banner type of signal. The semaphore signal consists of an arm 4 feet long attached near the top of a post, the arm standing normally in the horizontal position projecting to the right of the post as seen from an approaching train. To give the indication to proceed the arm is moved downward for signals working in the lower quadrant and upward for signals working in the upper quadrant. Upper quadrant signals are now standard, although until recently the lower quadrant signals were standard and are still used on a large proportion of the mileage of roads using block signals.

Block signals control the use of a section of track and show whether or not the track is occupied. Two arms may be used on a post, the upper to indicate immediate control and the other to repeat the indication of the upper arm on the next signal in advance. The upper arm is called the home signal, and the lower arm the distant signal. The distant signal is usually placed on a separate pole about 3500 feet in the rear of the home signal when a block system is in use having blocks longer than half a mile. At night the indication is given by the color of the light. The colors used are red, yellow, and green. Red indicates the home signal at stop, yellow the distant signal at stop,



and green either signal at clear. Thus, with both home and distant signals on the same post, a red light above a yellow would show the block occupied and would indicate stop; a green above a yellow, that the block was unoccupied but that the next home signal was at stop, and two green lights, that the next two blocks were both clear. There are also three position signals now in use in both the upper and lower quadrant. The three positions of the arm are horizontal 45° from the horizontal, and 90° from the horizontal. Horizontal indicates stop, 45° that the next home signal is at stop, and 90° that the next two blocks are clear. Color indications are, of course, red corresponding with horizontal, yellow corresponding with 45° , and green corresponding with 90° .

In all but the automatic systems the signals are thrown to safety (they are so arranged that they always stand at danger until pulled to the safety position) by pulling the levers resembling the reversing lever of a locomotive. These levers are located in the signalman's tower, and are connected to the signals by means of wires or rods. In the automatic system these signals are operated by the train itself; the wheels pass over track instruments or levers and set in motion certain mechanical or electrical operations, as a result of which the signals are removed.

In manual blocking, which is extensively used in England, each signalman controls the signals at his station. The code signaling between the block stations is generally done by means of electric bells. British lines also use in manual blocking an indicator giving a visual indication of the condition of the block. The block station has, for each block, an indicator connected by an electric circuit with a similar instrument at the other end of the block. On the dial of the indicator appear the words, "line clear," "train on line," and "line closed." By placing the hand of the indicator over any of these phrases, the instrument at the other end gives a like indication. The method of operation of the system is as follows: Attention is first called on the bell, and then station A will give to station B what is called the "be ready" signal, consisting of a certain number of strokes on the bell, varying so as to indicate the nature of the train. The man at station B, if the previous train has passed his station and he knows that the block between A and B is clear, repeats this signal. The train is then dispatched from A, the man at A gives the signal "train on line," the man at B acknowledges this by moving his own indicator, and, through the connection, the one at A to "train on line," and at once gives the "be ready" signal to station C. As soon as the train has passed B the man at B moves his indicator, and therefore the indicator at A, to "line clear"; and upon this being acknowledged by A the indicator is left vertical, signifying "line closed," and the operation has been completed so far as that particular train and particular block are concerned.

In controlled manual blocking the manipulation of the signals at the entrance to the block is controlled electrically by the signalman at the block station in advance. In what is termed the auto-manual system there is at each block station a track circuit of at least two or three rail lengths, which is used for automatically replacing the home signal to danger when the rear end of a train passes that signal. The

locking instruments are generally placed in front of the signalman and over the levers with which they operate. Each block station has one of these instruments for each block, the two instruments at the opposite ends of a block being connected by an electric circuit. The code signaling between the stations is accomplished by bell, as in manual blocking. The mode of operation is as follows: Prior to starting a train from A, the signalman there asks B to unlock the signal at A; and when B does so A throws his signal to safety, allowing the train to proceed towards B. As the rear of the train passes the home signal at A, that signal is thrown to danger by the local track circuit. As soon as his home signal goes to danger, A throws his lever to its normal position of danger, thereby locking it so that the signal cannot be thrown to safety again without permission from B. A drop-slide indicator or annunciator forms a part of the electric mechanism, displaying through a slotted opening on the front of the instrument case the words "free," "locked," and "train in block." By a system of electric locking working in connection with the indicators, and operated in part by the train through track circuits, B is unable to clear A while there is a train in the block.

A train-staff machine consists of an iron pillar with a vertical slot through nearly its entire length, in which is a supply of staffs. The head of the machine, called the "locking case," contains the electrical apparatus for manipulating the machine. Only one staff can be withdrawn at a time from the two machines governing a block; and this only with the consent of the signalman at the receiving station, who alone controls the staffs at the sending station. Another staff cannot be removed from either machine until the one already out is restored at one or the other end of the block. Since an engineman is not allowed to enter a block without a staff and only one staff can be out at a time, the method of operation is obvious.

Automatic block signals are operated by power, usually either by direct electrical current or by compressed air. The control of the power is effected by means of relays provided with contacts which open and close the circuit to the motor or regulate the pressure of the air. With the motor control the motor must be energized to give the proceed indication, and the signal assumes the stop position when the motor circuit is open. The control of the signal circuits is through the operation of a track circuit of which the rails form a part. The track is divided into sections of from 3000 to 5000 feet in length, each section separated from the next by an insulated rail joint. There is a battery at one end of the section and a relay at the other. When the block is unoccupied by a train, there is a current passing from the battery through one rail through the relay and back to the other rail, and from there back to the negative pole of the battery. While the relay is energized by this current, it in turn energizes the motor control, causing the signal to stand at clear. When a train passes the signal running on to the track circuit, the wheels of the train permit the current to flow from one track to the other without passing through the relay. The relay, of course, is de-energized, and the signal goes to stop. Thus, if there is any failure of the apparatus, the motor controlling the signal is no longer energized,

and the signal goes to stop. Failure, therefore, is on the side of safety. For semaphores worked by electric motors the complete equipment for double-track line with distant signals costs from \$1200 to \$2000 per mile. The maintenance cost would vary from \$175 to \$250 per mile per year.

The total miles of railroad worked by automatic block signals on Jan. 1, 1913, was 22,119—total track miles being 36,934. The total block signals other than automatic, including manual and manual controlled, was 83,950 road miles—108,403 track miles. Of the total automatic signal mileage (road mileage) 227 were exposed disk, 1705 inclosed disk, 435 by electro-pneumatic, 18,931 by electric motor, and 902 by electro-gas. The electro-pneumatic, electric motor, and electro-gas are, of course, semaphore signals. Of the manual block-system mileage (road mileage) 38,106 were by telegraph, 23,002 by telephone, 814 by electric bells, and by controlled manual, 4360, and by electric train staff, 478.

Automatic Train Stop. To be effective, the signals of any of the types mentioned above must, of course, be seen by the man or men in charge of the train. Collisions which have happened on railways where block signaling is installed have, in the majority of cases, been due to the failure of the engineman to observe the signal set against him or to act promptly on the information which the signal aspect has given him. To overcome this difficulty various devices for automatically stopping the train when the signal is set against the train have been experimented with. These devices are called automatic stops, and in its simplest form the automatic stop is a trip, fixed on the roadway and moving in unison with the usual visual signal, which is made to open an air valve on the engine or car, thereby applying the brakes or shutting off the propelling power, or doing both. The most important installations of automatic stops in America are those in use on the Interborough Rapid Transit of New York City and on the Pennsylvania Railroad in the Hudson River tunnels, and at drawbridges between New York and Newark and also on the Hudson and Manhattan tubes. On the Great Western Railway of England have been conducted the longest continued experiments with contacting devices on the ground exposed in winter. The device in use on the Interborough Rapid Transit was installed in 1904 and consists of mechanical trip stops with electro-pneumatic control. Most of these stops are located in subways, but a few are situated on surface lines, where they are exposed to snow and frost. The trip, when the signal is against the train, engages a lever on the first car, which automatically shuts off the power and applies the brakes. The device in use on the Pennsylvania differs slightly in that the lever on the engine is protected from accidental injury and also from being moved so as to cause an unnecessary stop by obstructions along the road. In front of the engine lever which is to engage with the ground apparatus is a bar rigidly fixed so as to clear the way for the lever itself, sweeping aside snow, ice, or an accidental obstruction. The ground apparatus is arranged as a tumbler, and when the rigid bar strikes this apparatus, the tumbler is simply turned over, bringing into the vertical position an arm which is then in position to engage the lever on the engine. The apparatus in use on the Great Western gives the adverse indication

by lifting a vertical engine member as it passes over a ramp on the ground, and a whistle is sounded and the brakes applied. If the block section is clear, an electric current flowing through the ramp and the engine member prevents the sounding of the whistle and the application of the brakes and gives an all-right signal by sounding a bell.

Besides the automatic train stop there are various kinds of cab signals which depend for their operation on the engaging of a lever on the locomotive or car with some part of a ground apparatus. It will be noted that the device in use on the Great Western is a combination of cab signal and automatic stop. Cab signals without the automatic stop have been in use since 1907 on this road. A cab signal which is now being experimented with in America differs quite radically in principle from those in use in the Great Western and most of those which have been experimented with on American roads. The principle in this so-called Cade cab signal is that, instead of some mechanical device being used on the ground apparatus to clear the signal and prevent it from sounding a whistle in the cab, the clearing must be done by the engineman in moving the lever on the engine so that it will not come in contact with the ground apparatus. This type of signal, however, is simply being experimented with at the present time.

Bibliography. Adams, *The Block System* (New York, 1901), Scott, *Automatic Block Signals* (New York, 1908), Elliott, *The A B C of Railroad Signaling* (Chicago, 1909). Consult also Reports of the Interstate Commerce Commission and particularly *Reports of the Block Signal and Train Control Board to the Interstate Commerce Commission* (Washington, 1908-12), as well as current issues of the *Signal Engineer* and the leading railway papers, which promptly record all new developments.

BLOCK TIN. An inferior variety of tin in the form of blocks. When the metal is reduced from its ores in a furnace, it is first poured into molds. The ingots thus procured are subsequently heated to incipient fusion in a reverberatory furnace, the pure tin, called grain tin, fusing first, is withdrawn, leaving the less pure tin, which is then melted at a higher temperature, poured into molds, and called block tin. See TIN.

BLOCKX, JAN (1851-1912) A Belgian composer. He was born at Antwerp, Jan. 25, 1851. His first musical education he received at the Flemish music school of his native city, where Benoit was his teacher in composition and Callaerts on the piano. Later he studied the piano at Brussels with L. Brassin, and then went to Leipzig. In 1886 he became professor at the Conservatory at Antwerp, and in 1901, after the death of Benoit, the director. At the same time he conducted also several musical societies, the most important of which was the *Cercle artistique*. In his compositions he kept himself remarkably free from the all-pervading influence of Wagner, but consciously followed in the footsteps of his teacher Benoit, directing all his energies towards the building up of a national Flemish school. His principal works are the great choral works for chorus, soli, and orchestra, *Vredesang Het droom vant paradijs*, *Clokke Roelandt*, *Scheidezang*, *Op den spoom*, and the operas *Jets vergeten* (1877), *Maitre Martin* (in French, 1892), *Ierbergprinses*

(1896), *Thiel Uylenspiegel* (1900), *De Bruid der Zee* (1901), *De Capel* (1903), *Blandée* (1908).

BLODGET, LORIN (1823-1901). An American physicist and statistician. He was born in Chautauqua Co., N. Y. In 1851 he became assistant at the Smithsonian Institution in charge of matters relating to climate and atmosphere. In 1857 he issued *Climatology of the United States and of the Temperate Latitudes of the North American Continent*, a work highly praised by Humboldt. He was for several years editor of the *North American* and secretary of the Board of Trade in Philadelphia and had charge of the statistical work in the United States Treasury. His contributions on finance, industrial progress, and kindred subjects comprise many volumes.

BLOEMAERT, blō'mārt, ABRAHAM (1564-1651). A Dutch historical painter and engraver. He was born in Dordrecht, the son of the sculptor Cornelis Bloemaert. He studied with various Dutch and Flemish masters in Holland, Flanders, and Paris, but was most influenced by Dirck Barends, Hieronymus Francken, and Frans Floris, all Italianized painters. He practiced his art in Amsterdam and, principally, in Utrecht, acquiring great wealth and fame. As many as 500 of his works were engraved by other artists. Bloemaert occupies a unique place in Dutch painting. Unlike other important Dutch masters, he followed Italian models and endeavored to establish a Dutch idealistic school. His subjects are mythological and religious and are found in all the chief European galleries, that of Copenhagen being especially rich. He was also a successful wood engraver in chiaroscuro and designed stained glasses and tapestries.

BLOEMFONTEIN, blōm'fōn-tin. The capital of the former Orange Free State, now the Orange River Colony, South Africa, near the Modder River, 95 miles east by south of Kimberley (Map: Orange Free State, C 4). It is situated at an altitude of over 4518 feet, is well built and lighted by electricity. There are a number of fine public edifices. Bloemfontein contains also several educational institutions, including colleges and a theological school, as well as a museum. Its favorable climate, which is very dry, has made the town of importance as a health resort. It is a centre of trade which consists mainly of wool. The industries include manufactories of aerated waters, salt, flour mills, and breweries. This town was one of the important strongholds of the South Africans during the Anglo-Boer War, and surrendered to Lord Roberts without resistance, March 13, 1900, after the Boers were defeated twice in the neighborhood. Its commercial growth dates from the close of the war in 1902. European pop., 1904, 15,501; 1911, 14,720.

BLOIS, blō'iz (ML. *Blesum*, *Blesis*, *Blesia*). The capital of the department of Loir-et-Cher, France, situated on a hill, on the right bank of the Loire, 35 miles southwest of Orleans (Map: France, N., G 5). The most important buildings of the town are the cathedral and castle, each on an elevation on either side of the main street, which runs in a hollow, and a church built in the twelfth century. The streets in the older portion of the town are narrow and tortuous and in places steep. Blois's educational establishments comprise a college, teachers' school, two seminaries, a museum, and a library.

A fine aqueduct of Roman origin, cut in the solid rock, supplies the city with water. It is the market of the neighboring region for agricultural and pastoral products, and carries on an active trade in grain, wines, and live stock. There are manufactories of boots, shoes, biscuits, furniture, and kindred articles, machinery and earthenware, and tanneries, foundries, and vinegar works. The most interesting edifice of the city is the old castle, a masterpiece of the early French Renaissance. Louis XII was born in it, and under its roof Charles, Duc d'Alençon, and Margaret of Anjou were married. The courts of Francis I, Henry II, Charles IX, and Henry III were held here occasionally, and in the castle the Duke of Guise and his brother were murdered, by order of Henry III, on Dec. 23, 1588. Isabella, queen of Charles VI, here found a retreat; it served as a prison for Maria de' Medici; Catharine de' Medici died within its walls; and Maria Louisa held her court here in 1814, after Paris had capitulated. Pop., 1896, 23,542; 1901, 20,422; 1911, 23,955. Consult Le Nail, *Le Château de Blois* (Paris, 1874); Bournon, *Blois, Chambord et les châteaux du Blésois* (Paris, 1908).

BLOK, blōk, PETRUS JOHANNES (1855-). A Dutch historian, born at Helder. He studied at Leyden and in 1884 was made professor of history at Groningen. He later occupied the same position at the University of Leyden and during Queen Wilhelmina's historical studies acted as her instructor. Blok's researches have been in connection with the social-political history of the Netherlands, especially during the Middle Ages. Among his works are: *Eene Hollandsche stad in de middeleeuwen* (1883; 2d ed., 1910); *Eene Hollandsche stad onder de Bourgondische heerschappij* (1884); *Geschiedenis van het Nederlandsche Volk* (8 vols., 1891-97), translated as the *History of the People of the Netherlands* (5 vols., New York, 1898-1912).

BLOMFIELD, blōm'fēld, CHARLES JAMES (1786-1857). Bishop of London; a learned and influential prelate of the Church of England. He was born May 20, 1786, at Bury St. Edmunds, in Suffolk, where his father was schoolmaster. Being well grounded by his father in the classics, Blomfield went to Cambridge, where he took high honors, B.A., 1808, and became fellow of Trinity College. After he had filled several curacies, the Bishop of London appointed him his chaplain, in recognition of his acknowledged philological and theological acquirements. Shortly after, he was called to the living of St. Botolph; in 1824 he was made Bishop of Chester, and in 1828 he was promoted to the see of London, on the translation of Bishop Howley to Canterbury. Blomfield's reputation for classical scholarship rests chiefly in his editions of *Callimachus* (London, 1815), and of several of the dramas of *Æschylus*. In connection with Rennel, he published the *Musæ Cantabrigienses*, and with Monk (1812), *Posthumous Tracts of Porson*, and in 1814 the *Adversaria Porsoni*. He also published lectures on the Gospel of John and on the Acts (1823-28; 3d ed., 1838). Blomfield was exceedingly active in the superintendence of his diocese and was a prime mover in the agitation for the erection of new churches. Under his presidency more churches were erected in London than under any other bishop since the Reformation. He died in London, Aug. 5, 1857. For his biog-

raphy, consult Blomfield (2 vols., London, 1863, 2d ed., 1864), and Biber (London, 1857)

BLOMMAERT, blóm'mart, PHILIPP (1809-71) A Flemish historian and philologist. His most noted work is *History of the Belgians (Aloude geschiedenis der Belgen of Nederduitschers*, Ghent, 1849), urging a German policy as opposed to the French. He published also mediocre poems (1834), a Flemish translation of the *Nibelungenlied* (qv), and learned editions of old Flemish poems of the period from the twelfth to the fourteenth century, *Oudvlaemsche gedichten der XII^e, XIII^e en XIV^e eeuwen* (Ghent, 1838-51), *Leven van St Amand* (1842-43), and *Theophilus, gedicht der XIV^e eeuw* (ib., 1836)

BLOMMAERT, SAMUEL (1590-1670) A Colonial patroon. He bought from the Indians a large tract of land, extending from Cape Henlopen to the mouth of the Delaware River—a tract almost the size of the present State of Delaware. The purchase was ratified by Peter Minuit and his council at Fort Amsterdam in 1630 and is the oldest deed for land in Delaware. The other owner of the land, Samuel Godyn, with Kiliaen Van Rensselaer, De Laet, and De Vries (qv), formed a company to settle this tract, and a colony of 30 was started at Lewes Creek under the governorship of Gillis Hosset. In the same year 12 square miles were added to the company's land by a purchase recorded at Fort Amsterdam. The colony, which had been named Swaanendale, was after a few years destroyed by the Indians in revenge for an act of Hosset's.

BLOMSTRAND, blóm'strand, CHRISTIAN WILHELM (1826-97) A Swedish chemist, born at Wexjö. He studied at the University of Lund and from 1862 to 1895 was professor of chemistry and mineralogy there. In 1861 he undertook a scientific expedition to Spitzbergen and in the same year was elected a member of the Stockholm Academy of Sciences. He discovered manganosite, vallerite, and other minerals, wrote several valuable text-books of organic chemistry, and also *Die Chemie der Jetztzeit vom Standpunkte der elektrotechnischen Auffassung aus Berzelius's Lehre entwickelt* (1899)

BLONDEL, *Fr* pron blón'dél' A noted French minstrel of the twelfth century, called a native of Nesle, a place difficult to identify. According to tradition, Blondel was the favorite of Richard the Lion-hearted, King of England, whom he accompanied to Palestine. While returning to England Richard was imprisoned by Leopold, Duke of Austria, and Blondel, determined to find his master, wandered through Germany in disguise until he came to the castle of Durrenstein, which he heard contained an illustrious captive. Feeling assured that Richard was in the castle, he tried to see him, but, failing, began to sing a song which he and Richard had composed. The first stanza was hardly sung before the well-known voice took up the second. The minstrel was overjoyed and, returning with all speed to England, was the means of securing Richard's ransom. This story dates from the following century and is not known to contain any element of truth. Blondel's poems were published at Rheims, in 1862, by Prosper Tarbé, under the title *Les Œuvres de Blondel de Néelle* (Rheims, 1862)

BLONDEL, blón'dél' The name of two French architects. 1 FRANÇOIS BLONDEL (1617-86) A diplomat, littérateur, military

engineer, and mathematician. He was noted for the triumphal arch of the Porte Saint-Denis in Paris (1674), as well as the Porte Saint-Antoine (not now extant), and became director of the new Académie de l'Architecture in 1672. He published *Cours d'architecture enseigné dans l'académie royale* (1675). 2 JACQUES FRANÇOIS BLONDEL (1705-74) An architect and engraver. He founded one of the earliest French private schools of architecture (1743) and became royal architect. He designed buildings at Metz, Strassburg, and elsewhere.

BLOND ESKIMOS See WHITE ESKIMOS

BLONDIN, blón'dân' (1824-97) A French tight-rope walker, whose real name was JEAN FRANÇOIS GRAVELET, the pseudonym referring to his blond hair. He was born at Saint-Omer, France, became an acrobat in his youth, and was soon famous for his eccentric and daring performances on a tight rope. He came to this country, gave many exhibitions in the Eastern States, and in the summer of 1850 performed the hazardous feat of crossing Niagara Falls on a tight rope. This act he repeated several hundred times, on one occasion carrying a man on his shoulders. Twice thereafter he returned to the United States, the last time in 1888, when the New York City authorities refused to let him perform in Central Park, whereupon he gave a series of exhibitions on Staten Island, and although then 64 years old carried his son on his shoulders across a long rope. He carried a cooking stove to the center of the line, where he made an omelet on it, and performed many other extraordinary feats, such as traversing the rope blindfolded, on stilts, enveloped in a sack, with his feet in waste-paper baskets, and so on.

BLOOD (probably akin to the verb to *blow*, to be in bloom). From the standpoint of histology, blood is usually classed as a tissue. It is developed from the middle layer, or mesoderm, of the embryo, and differs from the other tissues of the body in that its intercellular substance, the *liquor sanguinis*, or blood plasma, is fluid instead of solid. Human blood has a specific gravity varying between 1.056 and 1.066, it has a saline taste, a peculiar odor, and an alkaline reaction. The odor differs in different animals and is due to the presence of excretory products and volatile fatty acids. Its normal proportion to the body weight in man is one-fourteenth or one-thirteenth. When a drop of human blood is examined under the microscope, there are seen floating in the plasma certain foamed elements. We distinguish three main forms: the red blood cell, or corpuscle, the white blood cell, or corpuscle, and the blood plaques, or platelets.

The Red Blood Cells These are minute biconcave disks, averaging 7 to 8 micromillimeters, or about 1-3200 of an inch in their long diameter, and about one-fourth that in thickness. In adult human blood these cells are not nucleated, although in the human embryo they contain nuclei. This round, discoid, non-nucleated red blood cell is characteristic of mammals with the exception of the camel family, in which the red blood cells are non-nucleated, but oval. In birds, reptiles, amphibians, and fishes (with the exception of Cyclostomata, which have nucleated but round cells) the red blood cells are oval in shape and contain nuclei. As regards size, the largest corpuscles are found in the amphibia, those of the Amphibia being as

much as 75 micromillimeters in diameter, so that they may be distinguished by the unaided eye. The following table shows the size of the red blood cells in some of the more common mammals:

Elephant . . . . .	. . .0092 millimeter
Man . . . . .	. . .0079 "
Dog . . . . .	. . .0071 "
Rabbit . . . . .	. . .0070 "
Mouse . . . . .	. . .0067 "
Horse . . . . .	. . .0059 "

In normal human blood there are about 5,000,000 red blood cells per cubic millimeter of blood. As a general rule woman's blood has somewhat fewer than man's. Their specific gravity varies from 1.088 to 1.105. In different animals the number of red cells varies greatly, and the number of cells per cubic millimeter is much reduced in the lower animals, which have very large corpuscles. The redness characteristic of blood is not evident in a single corpuscle, which appears of a light straw color. When, however, a large number of the cells are seen together, the mass appears bright-red. The red blood corpuscles are embryologically of mesoblastic origin, beginning their life history as nucleated cells and as such possessing amoeboid movement and reproductive powers. At birth all nuclei have been lost as well as the powers of movement and of reproduction. After birth the production of new red corpuscles is believed to occur mainly in the marrow of bones. In embryonic life the distinction between red and white cell-producing tissues is not well defined; the entire blood-making system, marrow, spleen, and lymphatic glands, being concerned in the production of both varieties. The question as to the possibility of determining by microscopical examination whether a specimen of blood, particularly a blood stain, is human or animal, often presents itself in trials for murder. By reference to the table given, it will be seen that the red corpuscles in a considerable number of animals so closely approximate in size those of man that a positive answer to the question is often impossible. Then the drying of the corpuscles in a clot, which has to be softened with salt solution before examination can be made, introduces an uncertainty as to whether such corpuscles preserve their normal dimensions. On the other hand, it will be noted that a differentiation between human blood and that of lower animals whose red corpuscles are oval and nucleated—for example, birds and fishes—is comparatively easy. See BLOOD STAINS.

The White Blood Cells. These are much fewer in number than the red cells, the average being about one white cell to every four or five hundred of the red. The proportion, however, varies. They are slightly larger than the red cells, averaging about 8 to 10 micromillimeters in diameter. Their shape varies, largely from their amoeboid movement. They are nucleated, and the protoplasm of the cell body is more or less granular. Several varieties of the white blood cell are recognized, which may be classified as follows: (1) *Lymphocytes*, large and small, having a round nucleus surrounded by a small rim of cell body; and (2) *Leucocytes*, which may be further subdivided into large mononuclear leucocytes, in which there is a round or oval nucleus with considerable cell body; transitional forms, in which the nuclei are irregular in shape; polymorphonuclear leucocytes, in which there are several nuclei, and

eosinophile leucocytes, which contain large granules which stain bright red with eosin. The amoeboid movement of the white cells enables them to change their shape and to accomplish some locomotion. In this way they pass through the walls of the capillaries into the tissues, where they are known as wandering cells. (See CONNECTIVE TISSUE.) The blood platelets are small, non-nucleated, round or oval bodies, about one-third the diameter of the red blood corpuscle. They are found usually in groups and are prone to disintegration. Their function is unknown, but there is reason for believing that they are concerned in the process of coagulation when it occurs. Embryologically the white blood cells are derived, like the red cells, from the mesoblast. In the healthy adult granular white corpuscles, including the polymorphonuclear cells, the eosinophiles, and mast cells, are derived from the bone marrow; the lymphocytes from the lymphatic glands. The blood platelets are, according to Wright, merely bits broken off from the arms of the giant marrow cells.

The Plasma. The fluid portion of the blood, called the plasma, consists of water containing calcium salts, the chlorides of sodium and potassium, phosphates, albumen and other proteins, as well as fatty and extractive substances. The specific gravity of the plasma varies from 1.026 to 1.032.

If blood escapes from the body, coagulation or clotting occurs; after standing awhile, the blood separates into a contracting semi-solid mass, the clot, and a thin red fluid, the serum. The clot is composed of the red blood corpuscles matted together with fibrin (q.v.). The process of clotting is accelerated by cold. In the body clotting of the blood may occur in the blood vessels, in case of an obstruction to the blood stream or infection by bacteria; or it may occur in the neighboring tissues where a blood vessel is ruptured. After death the blood remains fluid in the capillaries, but clots in the veins. Clots are sometimes found in the cavities of the heart. Certain diseases cause alterations in the blood. In a condition called *hemophilia* the blood clots with difficulty, if at all (see BLEEDING); and persons possessing this peculiarity are liable to bleed to death from a small wound, as that left by drawing a tooth. This peculiarity is called the hemorrhagic diathesis, and it is said to be found oftenest among Germans.

The color of the blood is due to the hemoglobin (q.v.) of the red blood corpuscles, the carrier of oxygen from the lungs to the tissues. (See RESPIRATION.) For a description of some of the diseases of the blood, see ANÆMIA. Consult Cabot, *Clinical Examination of the Blood* (New York, 1904), and Da Costa, *Clinical Hematology* (Philadelphia, 1905).

BLOOD, CORRUPTION OF. In English law, the forfeiture of the right of inheritance by the heirs of one convicted of treason or felony. Attainder (q.v.) was the ordinary consequence of judgment upon conviction of a crime involving the penalty of death or outlawry, or it might be imposed on a person accused of treason or felony by act of Parliament. (See BILL OF ATTAINDER.) In any case, however incurred, it had the effect of "corrupting the blood" of the person attained, i.e., of cutting him off from the relationships of consanguinity on which inheritance was made to depend. His children were not his children, and when he died he left no one capable of inheriting from him. The

effect, therefore, was the same as if the attainted person had died without natural heirs his land at once escheated to the lord of whom it was held (see ESCHEAT), subject, however, to the paramount right of the crown to forfeiture of the land, absolutely in the case of conviction for treason, for a year and a day, in the case of conviction for felony. See FORFEITURE.

BLOOD, EATING OF. As among other peoples of antiquity, so among the Hebrews the blood of animals was regarded as the seat and source of life, and hence the blood was forbidden as food. All animal food being originally of a sacrificial character, the prohibition against the eating of the blood, carried back by tradition to the days of Noah (Gen ix 4), is thus shown to be connected with sacrificial observances. In Lev xvi 11, 12, a reason is given for abstaining from eating blood, its use is confined to the sacred act of atonement. It has been suggested that certain peoples did not drink blood, because they believed that, if they did so, the spirit of the animal from which it came would enter into them. Consult Trumbull, *The Blood Covenant*, p 214 f (1885), and Frazer, *The Golden Bough*, vol 1, pp. 178, 179 (1890), Gulland and Goodall, *Blood* (Edinburgh, 1912), Buchanan, *Blood in Health and Disease* (London, 1900), Kastle, *Chemical Tests for Blood* (Washington, 1909). See SACRIFICE.

BLOOD, THOMAS (1618-80). A bold and successful adventurer, commonly known as "Colonel Blood." He was the son of a prosperous blacksmith and was probably born in Ireland, but the place of his birth is uncertain. In the great Irish rebellion he served with the Parliamentary army. He visited England, married a Lancashire lady, was made a justice of the peace by Henry Cromwell, and received large assignments of land in Ireland. He was deprived of these at the Restoration and in a spirit of reprisal associated himself with several disbanded Cromwellians who were ripe for mischief. He put himself at the head of an insurrectionary plot, which was to begin with the seizure of Dublin Castle, and of Ormond, the Lord Lieutenant. On its discovery he escaped, while his chief accomplices were seized and executed, although he made a bold attempt to rescue them. He remained in hiding, but eventually fled to Holland, where he was received with high consideration. He soon found his way back to England, to try what mischief might be brewed among the Fifth-Monarchy men. Finding no prospects of success, he repaired to Scotland, invited by the turbulent state of affairs, and was present at the fight of Pentland, Nov 27, 1666. On the night of Dec 6, 1670, the Duke of Ormond was seized in his coach in St James's Street by a gang of braves, tied on horseback behind one of them, and hurried away toward Tyburn. The timely approach of his attendants at the moment when he had succeeded in struggling with his riding companion to the ground probably saved him from hanging. The leader in this daring villainy was Blood, and so well had he contrived it that he did not even incur suspicion. His next enterprise was still more wild and dangerous. On May 9, 1671, disguised as a clergyman and accompanied by his former accomplices, he entered the Tower with the determination to carry off the regalia of England. After almost murdering the keeper of the jewels he succeeded in carrying off the crown under his cloak, while one of his associates bore away the orb. They

were immediately pursued, however, seized, and committed to the Tower jail. But a singular turn of fortune awaited Blood. At the suggestion of Buckingham, who was accused of having hired Blood to attack the Duke of Ormond, King Charles visited the dauntless miscreant in prison and, degrading the threat that there were hundreds of Blood's associates banded together by oath to avenge the death of any of the fraternity, pardoned him, took him to court, restored to him his Irish estates, valued at £500 a year, and raised him so high in favor that for several years Colonel Blood was an influential medium of royal patronage. After the fall of the "Cabal" ministry Blood became hostile to Buckingham and, accused of originating a scandalous charge against him, was committed to prison. He was bailed out and died in his own house in 1680. Scott introduces Blood in *Peveril of the Peak*. Consult Seeombe, *Lives of Twelve Bad Men* (New York, 1896).

BLOOD/BIRD. The name in southern Australia of several wax-billed finches and other small birds marked with bright red, especially the "soldier bird" (*Myzomela sanguinolenta*), a beautiful species of honey eater, black, with the head, neck, breast, and back of the male rich scarlet.

BLOOD CLAM. See ARE SHELL.

BLOOD FEUD. (AS *fæhf*, from *fah*, inimical, OHG *fæhde* injury, enmity, Ger *Fehde*, feud.) In primitive society, the legalized right of private vengeance for crimes of violence. The institution of the feud and its regulation by law, inasmuch as it involves a restriction on the primary impulse of revenge, marks a great advance in the direction of a settled social order. The primitive theory of the responsibility of the family, clan, and tribe for the acts of its members tended to convert an act of private vengeance into a state of war. The developing sense of law and order restricted the right of vengeance to the immediate family, or next of kin, called the "avenger of blood" (see AVENGER OF BLOOD) of the injured person, and limited the punishment to the person committing the crime or to those who protected him from the vengeance incurred. The right was further restricted by the doctrine of sanctuary and the institution of places of refuge for the manslayer fleeing from the avenger of blood (see ASYLUM, CITY OF REFUGE), and, at a later period, by the institution of the wergild (man price, blood money) with which the hunted criminal might purchase exemption from the vengeance due him. Ultimately the acceptance of this blood money became compulsory, and the codes of early law which have come down to us are full of minute regulations fixing the amount to be paid for various crimes of violence according to the state or dignity of the victim of the crime, and specifying the persons entitled to share in the payment.

The stage of society marked by the blood feud has prevailed among most of the primitive peoples with whose history we are acquainted, and it forms a part of nearly all systems of primitive law. We find marked traces of it in the Mosiac legislation, and it constitutes an important part of the law of the Teutonic communities which planted themselves on the ruins of the Roman Empire. Anglo-Saxon law is largely concerned with it, and in England it survived, nominally at least, in the form of the wager of battle, until abolished by Act of Parliament in 1819. (See BATTLE, TRIAL BY, FEUD.)

Consult: Jenks, *Law and Politics in the Middle Ages*; Maine, *Ancient Law* (London, 1905) and *Lectures on the Early History of Institutions* (6th ed., London, 1893); Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899); and Stephen, *History of the Criminal Law of England* (London, 1883).

BLOODFLOWER (*Hæmanthus*). A genus of bulbous-rooted plants, of the family Amaryllidaceæ, including about 60 species, natives of tropical South Africa, some of which are among the prized ornaments of our greenhouses. They take their name from the usual color of their flowers, which form a fine head or cluster, arising from a rosette of root leaves. The fruit is a berry, usually with three seeds. The leaves of the different species exhibit considerable diversity of form—in some almost linear, in others almost round; in some, also, they are erect, in others appressed to the ground. The bulbs of some of the finest species of bloodflower being very slow to produce offshoots, a curious method of propagating them is resorted to by gardeners, which is occasionally practiced also with other bulbous-rooted plants, by cutting them across above the middle, upon which a number of young bulbs form around the outer edge. *Hæmanthus multiflorus*, *Hæmanthus lindeni*, and *Hæmanthus puniceus* are among the most handsome in hothouse cultivation. *Hæmanthus albiflos* has white flowers, and some of the others are grown as oddities. The inspissated juice of *Hæmanthus tomentosus*, now known as *Buphane disticha*, is used by the natives of South Africa for poisoning their arrows.

BLOODHOUND, or **SLEUTHHOUND**. A variety of hound often used in tracking criminals. See **HOUND**.

BLOODLETTING. See **BLEEDING**; **VENE-SECTION**.

BLOOD MONEY. In early law, the compensation paid by a manslayer to the next of kin of the man slain, securing the offender and his relatives against subsequent retaliation. It was common in Scandinavian and Teutonic countries until after the introduction of Christianity. The amount of the payment was fixed by law, as well as the persons who were entitled to exact and share it. (See **AVENGER OF BLOOD**.) The principle was not limited to cases of manslaughter, but was ultimately extended to all crimes of violence. Certain crimes, however, by reason of their enormity or their sacrilegious character—as slaying a person in church or when sleeping—or because they involved a breach of the King's peace, were "bootless," i.e., incapable of commutation for money. The perpetrator of such an offense came under the King's ban, was outlawed, and abandoned to his enemies. (See **BANISHMENT**; **OUTLAWRY**.) Even in such a case, however, it is provided in one of the barbaric codes of the Middle Ages that the offender "may redeem himself from the wilderness with 40 marks when the injured party has interceded for him." See **BLOOD FEUD**; **WERGILD**, and the authorities there referred to.

BLOOD OF OUR SAVIOUR, also called **ORDER OF OUR REDEEMER AND THE PRECIOUS BLOOD OF JESUS CHRIST**. An order of knighthood in Mantua, instituted by Duke Vincenzo Gonzaga in 1608, on the occasion of the marriage of his son with a daughter of the Duke of Savoy. It consisted of 20 knights, the Mantuan dukes being sovereigns. The collar was embroidered with scrolls containing ingots

of gold in crucibles over a fire, with the words *Domine probasti me*. To the collar was pendant an oval medallion with two angels kneeling before an altar, on which were three drops of blood, with the words *Nihil isto triste recepto*. The name originated in the belief that in St. Andrew's Church, in Mantua, certain drops of our Saviour's blood are preserved. Consult Laurence-Ascher, *Orders of Chivalry* (London, 1887), and Wahlen, *Ordres de Chevalerie* (Brussels, 1844).

BLOOD OF SAINT JANUARIUS, *jân'n-a'-rî-ûs*. See **JANUARIUS**, **SAINT**.

BLOOD PHEASANT, *fèz'ant* (from the red color about the throat and breast). One of several species of small and beautiful Himalayan quail-like pheasants, of the genus *Ithaginis*. See **PHEASANT**.

BLOOD POISONING. See **PYÆMIA**.

BLOOD PRESSURE. The estimation of the blood pressure within the circulatory system has come to possess a considerable significance in the study of diseases. The blood as it flows through the vessels necessarily exerts lateral pressure upon their walls; this pressure being dependent on several factors, viz., the energy of the heart, the volume of blood, the elasticity of the vessel walls, and the peripheral resistance of the capillaries. It is evident that anything which dilates or contracts the blood vessels or affects their elasticity, or any disease of the heart interfering with its propulsive power, correspondingly affects the blood pressure. In the healthy animal the blood pressure, within certain average limits, is maintained with great constancy. The complex nervous mechanisms, controlled both by cerebro-spinal and sympathetic nerve centres, which balance and co-ordinate the activity of the heart and arterial muscles, seem to allow of great local variations in blood flow without disturbing the general arterial pressure.

Hales gave the first demonstration of blood pressure in 1733. This was more than a century after Harvey (q.v.) discovered the circulation of the blood. But no definite advance was made until, in 1828, Poiseuille and Ludwig introduced the mercurial manometer. Since then many instruments have been devised, but the subject is still far from being thoroughly understood. In animals the pressure may be taken directly by inserting a tube into a blood vessel and connecting it with a manometer; in human beings this method is obviously impracticable, and, instead, a sphygmomanometer is used. This instrument consists essentially of a broad band, lined with a flat distensible rubber tube, which fits around the arm, and which is inflated with a rubber tube and bulb, until the artery is compressed and the pulse no longer felt. Another tube connects the armlet with a manometer, and the amount by which the mercury is raised represents the blood pressure. A graphic reading may be obtained by means of a delicate needle floated on the column of mercury. The point of the needle is brought into contact with a revolving cylinder, and the slightest variations of the pulse and pressure thereby recorded. See **SPHYGMOGRAPHY**.

The average arterial blood pressure in healthy adults during cardiac systole varies between 100 mm. and 130 mm. (Janeway): in childhood 90 to 110 mm. may be considered normal. After middle life the pressure increases, still within normal limits, to 145 or 160 mm. Anything

above this point is looked upon as pathological. In kidney or brain diseases a reading of 250 or 300 mm is not uncommon. Blood pressure varies in different individuals, and in the same individuals at different times. It undergoes spontaneous diurnal fluctuations, being lowest during sleep, it is influenced by posture, by the process of digestion, and by external changes of temperature and by altitude, it is raised by muscular exertion and increased by mental emotions. Since an unduly high and steady blood pressure is generally admitted to be a factor in the production of arterio-sclerosis (q.v.), it becomes of interest to know what influences are likely to bring this about. Excessive mental or physical work is an important factor, and so we see the brain worker and the laborer equally affected. Chronic worry, the habitual use of tobacco, overeating, and, to some extent, steady drinking, also conduce to hypertension. Poisons generated within the body cause extreme hypertension, those resulting from Bright's disease, uremia, eclampsia, and intestinal fermentation are common causes. Abnormally low pressure (hypotension) is observed in infectious and wasting diseases, hemorrhage, collapse, and shock. Chronic high pressure may be controlled, in a measure, by regulating the life of the individual. Abstinence from worry and business cares, moderation in eating, drinking, and smoking, and indulgence in the milder forms of outdoor exercise must be enjoined. In sudden rises of the blood pressure, amyl nitrite and nitroglycerin are invaluable remedies, while potassium iodide is the drug most relied upon in chronic cases.

The uses of blood-pressure estimation in medicine are numerous. A knowledge of the true condition of the circulatory system is thereby gained which ordinary palpation of the pulse cannot reveal. By combating hypertension the evils of arterio-sclerosis can often be postponed for years. In surgery it makes possible a more careful choice of anesthetics, and Cushing and Crile have shown that surgical shock can be anticipated and avoided by watching the blood pressure during operations. Consult Janeway, *The Clinical Study of Blood Pressure* (New York, 1904), Crile, *Blood Pressure in Surgery* (Philadelphia, 1903), Faught, *Blood Pressure* (Philadelphia, 1913).

BLOOD RAIN. A shower leaving red stains, due essentially to microscopic organisms containing red oxide of iron. The organisms consist of fungi, numerous specimens of which are carried down from the atmosphere by rain and snow. Such organisms are often capable of imparting to snow a pink, red, or bluish tint, and sometimes exhibit the phenomenon of phosphorescence. Similarly, black rain may be caused by the presence of a black fungus. The above-mentioned low forms of plants grow, especially in torrid zones, in ponds that hold water during a short season of each year, being dried up during seasons of drought which last for several months. From these desiccated basins the fine dust and minute fungi are raised into the atmosphere by wind and carried for hundreds of miles. Decrease of temperature causes rainfall or snowfall, during which the dust particles are carried to the earth. The gray dust, consisting principally of diatoms, being rather denser, may descend without rain. Such dust showers have been observed to fall upon vessels in the Atlantic Ocean as far as 1000

miles west of the coast of Africa. Showers of blood rain and dust are observed principally over the area lying east west, and north of the Sahara, but they are not restricted to this region. See *ÆOLIAN ACCUMULATIONS, RAIN, RED SNOW*.

BLOODROOT. See SANGUINARIA.

BLOOD STAINS. In some criminal trials it is a matter of extreme importance to determine whether certain stains found upon various weapons, upon clothing, or upon carpets, walls, furniture, etc., have been made by blood or by some other substance. Further, there comes up the question as to whether a blood stain has been made by human blood or by the blood of one of the lower animals. The appearance of blood stains varies, depending largely on the character of the substance stained, age of the stain, etc. As a rule, the more permeable the substance, the brighter is the stain. Thus, on cloth the serum is quickly absorbed, leaving a rather bright stain from the colored elements of the blood, while stains on hard surfaces, such as metal and polished wood, are usually of a dark color. The question as to whether a given stain is blood is in most cases comparatively easy to answer. The determination may be made by chemical means, by the use of the microscope, or that of the spectroscope. The *guaiacum test* is as follows: If a drop of blood, or a drop of water with which a blood stain has been moistened, be placed upon a blotting paper and a drop of tincture of guaiacum added, the further addition of a drop of hydrogen peroxide will result in the production of a sapphire-blue color. The fact that certain substances other than blood may give this or a similar reaction tends to vitiate the value of this test. Another test, known as the *hemin test*, is as follows: To a little of the powder scraped from a blood stain is added a drop of glacial acetic acid with a trace of sodium chloride. After standing for some time the mixture is gently heated. As evaporation takes place, the specimen should be examined under the microscope, when numerous rhomboidal crystals will be seen of a reddish, brown, or yellow color. These are produced from the coloring matter of the blood, and are known as hemin crystals. A positive result from this test is extremely reliable. On the other hand, a failure to obtain crystals cannot be considered positive proof that the stain is not blood. Very accurate results may be obtained by *spectroscopic* examination of blood stains. The fact that hemoglobin (from a fresh stain) and hematin (from an old stain) exist each in two states of oxidation, and that each state has its own characteristic absorption bands in the spectrum, increases the accuracy of this test. The *microscope* alone is often of value in determining the nature of blood stains. Thus, if a stain be moistened with a little normal saline solution (sodium chloride 6 per cent in water), and some of the fluid be examined under the microscope, it is often possible, even in the case of very old stains, to recognize the blood corpuscles.

The differentiation of the blood of a man from that of a woman or child, or of the blood of one person from that of another, is apparently impossible. Immunized antiserum, obtained from the blood of rabbits, produces a precipitate with human blood only. Consult Major Sutherland, *Blood Stains Their Detection and the Determination of their Source* (New York, 1907), and

Witthaus and Becker, *Medical Jurisprudence*, vol. iii (New York, 1909). See BLOOD.

BLOODSTONE. See HELIOTROPE.

BLOOD TRANSFUSION. See TRANSFUSION OF BLOOD.

BLOOD VESSELS. See AORTA; ARTERY; CAPILLARIES; VEIN.

BLOOD WORM. The name of various red worms and annelids. That commonly known to anglers as the bloodworm, used for bait, is the worm-like aquatic larva of a midge (*Chironomus*), which swarms about stagnant pools.

BLOODY ASSIZES. The name given to a series of trials for treason conducted by Lord Chief Justice Jeffreys in the western counties of England after the suppression of Monmouth's rebellion in 1685. See JEFFREYS, GEORGE.

BLOODY MARY. The popular designation of the daughter of Henry VIII, Queen of England in 1553-58, because of her persecution of Protestants.

BLOODY TOWER. The name given to one of the towers of the Tower of London, in which Richard III is said to have procured the murder of the young sons of Edward IV.

BLOOM. The white, waxy or glaucous covering of various fruits and leaves, especially common on the leaves of drought plants. See XEROPHYTES.

BLOOM. An appearance on paintings resembling in some measure the bloom on certain kinds of fruit, such as peaches, plums, etc. (hence the name), produced, in all probability, by the presence of moisture in the varnish, or on the surface of the painting when the varnish is laid on. The bloom destroys the transparency, and is consequently very injurious to the general effect of a picture. It is best prevented by carefully drying the picture and heating the varnish before applying it, after which a soft brush should be employed to smooth the surface of the picture, which should be finally placed in the sunshine to dry.

BLOOMARY, BLOOMERY, or BLOMARY, bloom'ā-ri (Eng. *blomm*, AS. *blōma*, a mass or lump, in *iscenes blōma*, a lump or bloom of iron). A furnace or hearth for making wrought iron directly from the ore. See IRON AND STEEL.

BLOOMER, AMELIA JENKS (1818-94). An American reformer. She was born in Homer, N. Y., and for several years lectured and wrote on the temperance question. She was a prominent advocate of woman's suffrage, but is remembered chiefly for her enthusiastic adoption of the so-called "bloomer" costume, originally devised and introduced by Mrs. Elizabeth Smith Miller.

BLOOMFIELD. A town and the county seat of Greene Co., Ind., 78 miles southwest of Indianapolis, on the White River, and on the Evansville and Indianapolis, the Illinois Central, and the Chicago, Indianapolis, and Louisville railroads. It has a Carnegie library, flour and lumber mills, and a chair factory, and manufactures tools, lifting jacks, novelties of steel, iron, wood, and clay, and carries on considerable trade in coal, agricultural produce, lumber, grain, and live stock. Pop., 1900, 1583; 1910, 2069.

BLOOMFIELD. A city and the county seat of Davis Co., Iowa, 70 miles northwest of Keokuk; on the Burlington and the Wabash railroads (Map: Iowa, B 4). It has a fine high-school building, a Carnegie library, opera house,

and is the seat of the Southern Iowa Normal School. Bloomfield's interests are primarily agricultural, and it carries on a large trade in stock, corn, oats, hay, and cattle. The city owns and operates its water works and electric light plant. Pop., 1890, 1913, 1900, 2105; 1910, 2028.

BLOOMFIELD. A town in Essex Co., N. J., adjoining Newark, and 11 miles from New York City; on the Erie and the Lackawanna railroads, and on the Morris Canal (Map: New Jersey, D 2). It is the seat of the German Theological Seminary of Newark (Presbyterian), opened in 1869, Job Haines Home for Aged People; and possesses, among the features of interest, the National Bank Building, Jarvie Memorial Library, Knox Hall, and Westminster and First Presbyterian churches, the latter built in 1790. The town has a number of suburban residences and, as one of its chief attractions, a park developed from the "Common" used during the Revolution as training grounds. There are important manufactures, including woolen cloth, lamps, cod-liver oil, brushes, plumbers' supplies, straw board, silk, electric elevators, hats, rubber goods, paper, pins, and railroad brake shoes. Under a charter of 1900 the government is vested in a mayor and a town council. Pop., 1890, 7708; 1900, 9063, 1910, 15,070. Settled as early as 1675, Bloomfield was a part of Newark until incorporated as a separate township in 1812. Its present name was chosen in 1796 in honor of Gen. Joseph Bloomfield, a Revolutionary officer, afterward Governor of New Jersey. Consult Shaw, *History of Essex and Hudson Counties, New Jersey* (Philadelphia, 1884), and Folsom, *Bloomfield, Old and New* (1913).

BLOOMFIELD, JOSEPH (c.1755-1823). An American soldier, born in Woodbridge, N. J. He attained the rank of major in the Revolutionary War, and from 1801 to 1812 was Governor of New Jersey. He served as brigadier general in the American army during the War of 1812 and from 1817 to 1821 was a member of Congress.

BLOOMFIELD, MAURICE (1855-). An American philologist and Sanskrit scholar. He was born in Bielitz, Austrian Silesia, Feb. 23, 1855. He came to the United States in 1867; studied at the old University of Chicago and at Furman University, Greenville, S. C., and was a graduate pupil of William Dwight Whitney at Yale, 1877-78. He was a fellow of Johns Hopkins University, 1878-79, and then studied in Berlin and Leipzig, 1879-81. On his return to America in 1881 he received an associate professorship in Johns Hopkins, and afterward the full professorial chair of Sanskrit and comparative philology, which he holds in that university. In 1896 Princeton bestowed the LL.D. degree upon him. He is an extensive contributor to the Oriental journals and philological periodicals; and his researches in connection with the Atharva-Veda are especially important. Mention may be made of his edition of the *Kaṣikā-Sūtra*, New Haven, 1890 (American Oriental Society's Journal, vol. xiv); *Hymns of the Atharva-Veda Translated*, Oxford, 1897 (Sacred Books of the East, vol. xlii); *The Atharva-Veda*, Strassburg, 1899 (Bühler's *Grundriss der indo-arischen Philologie*); *The Kasmirian Atharva-Veda*, reproduction of the manuscript by chromolithography (Baltimore, 1901); *Cerberus, the Dog of Hades* (Chicago, 1905); *The Religion of the Veda* (New York, 1908), which

treats the subject thoroughly from the Rig-Veda to the Upanishads, and a *Vedic Concordance* (which appeared in the Harvard Oriental Series, Cambridge, 1906)

BLOOMFIELD, ROBERT (1766-1823) An English pastoral poet. He was born at Honington, Suffolk, Dec. 3, 1766, and was the son of a poor tailor, who died, leaving Robert an infant. His mother with difficulty subsisted by teaching a school, where Bloomfield learned to read. At the age of 11 he was hired to a farmer, but ultimately became a shoemaker in London, where in a poor garret he wrote his *Fanner's Boy*. It was published in 1800, had extraordinary popularity, and was translated into a number of languages. He subsequently published *Rural Tales*, *Wild Flowers*, and other pieces. He died, nearly insane, at Sheffield, Aug. 19, 1823. Consult Weston, *Works of Robert Bloomfield* (London, 1824), and Hart, *Selections from Correspondence* (London, 1870).

BLOOMFIELD-ZEISLER, bloom'feld-ts'ler, FANNY (1866-) An American pianist, born in Bielitz, Austrian Silesia, July 16, 1866. In 1868 her parents came to America, settling in Chicago. At the age of six, before receiving any musical instruction, she began picking out tunes on the piano. In 1877 Madame Essipoff, then on tour in the United States, heard her play and advised that she become a pupil of Leschetzky, which she did the following year, remaining with him until 1883. After successful appearances abroad she returned to America, where she has played with the principal orchestras. She also has given many recitals and has made several brilliantly successful foreign tours, playing in the summer of 1896 at Cologne at the Lower Rhine Music Festival. She is one of the foremost living pianists.

BLOOMINGTON A city and the county seat of McLean Co., Ill., 126 miles southwest of Chicago, on the Illinois Central, the Chicago and Alton, the Lake Erie and Western, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads (Map Illinois, D 3). It contains the construction and repair shops of the Chicago and Alton Railroad, and has extensive coal-mining, pork-packing, stock-raising, vegetable-canning, and stove manufacturing interests, besides flour mills, foundries, harness, agricultural machinery, candy, and plow factories, funneccs, and brickyards. The city is the seat of the Illinois Wesleyan University (Methodist Episcopal), founded in 1852, and at Normal, 2 miles north, is the Illinois State Normal University. Bloomington has several parks, a marble courthouse, a fine city hall, a large public library, two hospitals, four sanitariums, and a beautiful Soldiers' Monument. There is also a soldiers' orphans' home at Normal. Settled in 1831, Bloomington was chartered as a city in 1850 and in 1900 celebrated the semicentennial of its incorporation. Under the charter of 1897, now in effect, the city is governed by a mayor, elected for two years, and a city council. The school board, city attorney, city clerk, superintendent of streets, and city engineer are elected by popular vote. Town meetings are convened annually to levy road, bridge, and town taxes. The city owns and operates its water works and electric light plant. Pop., 1890, 20,484; 1900, 23,286; 1910, 25,768.

BLOOMINGTON A city and the county seat of Monroe Co., Ind., 50 miles southwest of

Indianapolis, on the Chicago, Indianapolis, and Louisville, and the Indianapolis Southern railroads (Map Indiana, C 3). It is the seat of the Indiana State University (qv), and contains besides the college buildings, a fine courthouse, a theatre, and a hospital. The city has vast quarries of oolitic limestone, flouing, planing, and saw mills, and manufactures furniture baskets, harness, gloves and mittens, glass novelties, cresseted paving blocks, brooms, and storage batteries. It was settled about 1818. The government, under a general State law, is administered by a mayor, elected every four years, and a council. The water works are owned by the city. Pop., 1890, 4018; 1900, 6460; 1910, 8838.

BLOOMSBURG A town and the county seat of Columbia Co., Pa., 40 miles southwest of Wilkesbarre, on the Susquehanna River, and on the Lackawanna, the Philadelphia and Reading, the Pennsylvania, and the Bloomsburg and Sullivan railroads (Map Pennsylvania, H 4). It is the seat of a State normal school and has a hospital, a library, and fine county and town buildings. The town is in a region which produces iron and coal and contains, among its industrial establishments, foundries, car works, flour, woolen, silk, and lumber mills, and carriage, furniture, fountain-pen, match, and carpet factories. Pop., 1900, 6170; 1910, 7413.

BLOSSOM, HENRY MARTYN, JR. (1866-) An American playwright and novelist. He was born in St. Louis and for a time was in the insurance business. He wrote a little fiction, including *The Documents in Evidence* and *Cheekers a Hard-Luck Story* (1897), but is better known as the author of the plays, *Cheekers* (dramatized from his book), and *The Yankee Consul*, the comic operas, *Mlle. Modiste*, in which Fritz Schell starred, and *The Slim Princess*, and the musical comedies, *The Red Mill* and *The Man from Cooch's*.

BLOT IN THE SCUTCHEON A The title of a tragedy by Robert Browning (1841), played by Lawrence Barrett in America. It is based upon the fatal consequences of a childish passion, uselessly concealed.

BLOUET, blow'a, PAUL See O'REILLY, MAX.

BLOUNT, WILLIAM (1740-1800) An American politician, born in Bertie Co., N. C. He was a member of the North Carolina Legislature for several terms after 1780, of the Continental Congress in 1783-84, and again in 1786-87, and of the Constitutional Convention of 1787. In 1790 he was appointed by Washington to be Governor of "The Territory of the United States South of the Ohio" (including the present Tennessee), and soon afterward founded the city of Knoxville. When Tennessee was admitted to the Union in 1796, Blount was elected to the United States Senate from that State, but in July, 1797, he was detected in a conspiracy to wrest New Orleans and the Floridas from the Spaniards on behalf of Great Britain and was summarily expelled on a charge of "high misdemeanor entirely inconsistent with his public trust and duty." The pro-British scheme caused much excitement at the time, both in and out of Congress, and has since been known as "Blount's Conspiracy." His formal trial was postponed until 1798, and early in 1799 the Senate decided to dismiss the impeachment on account of a lack of jurisdiction, Blount not then being a member. The whole incident increased considerably Blount's popu-

larity in Tennessee, and soon after his expulsion he was elected to the State Senate, over which he presided for some time. Consult an article by Mrs. M. J. Lamb, in *Magazine of American History*, vol. xiii (New York, 1884).

BLOUSE, blouz (of uncertain origin). A name borrowed from the French for the loose, sack-like over-garment which, as worn in England by wagoners and farm laborers, is called a smock frock. The English smock frock is made of coarse and unbleached linen, sometimes plaited and embroidered. In Germany it is frequently tightened to the body by a belt and is sometimes made of coarse woolen. In Russia blouses, usually of coarse material, are generally worn by peasants and factory hands, while students of gymnasiums frequently wear a finer garment resembling the blouse as a surcoat. France is preëminently the country of blouses, however. There they are worn universally by the laboring classes in towns, and so characteristic is this garment that the French populace is often called the "Blouses." The white blouse is a Sunday dress with the working classes in France, and has often served as a countersign among the leaders of sections in secret societies.

BLOW, blō, Jouyn (1648-1708). An English composer and musician; born at North Collingham (Nottinghamshire). He was trained in music as one of the children of the Chapel Royal under Capt. Henry Cooke. In 1680 he was appointed organist of Westminster Abbey and in 1685 composer-in-ordinary to James II. From 1687 to 1693 he was master of the choristers at St. Paul's Cathedral, and in 1699 became composer of the Chapel Royal. He published *Lessons for the Harpsichord* (1698) and a collection of songs entitled *Amphion Anglicus* (1700). His other works, mostly unprinted, comprise 14 services, about 100 anthems, sacred songs, and many odes, including the setting for Dryden's ode on the death of Purcell (1695).

BLOWFLY. See FLESH FLY.

BLOWGUN. A weapon used both for war and hunting by the tribes formerly inhabiting the Gulf region of the United States, by the Iroquois of New York, by the natives of equatorial South America and by the Malays of the East Indies. It consists of a straight tube from 8 to 12 feet in length, from which a light dart is forcibly expelled by the breath. The tube is made of a hollow reed or cane, the joints of which have been bored or burned through, or from two pieces of wood hollowed out and fitted together in lute fashion. The arrow is usually tipped with poison, so that a slight scratch will produce death or paralysis.

BLOWING MACHINES. Mechanical contrivances for producing an artificial current of air, often of considerable intensity. Properly speaking, a blowing engine should deliver large volumes of air at a low pressure; and when the intensity of pressure becomes greater than a few pounds per square inch and the volume and weight of air less, the machine should be called an air compressor. The dividing line is vague and undefined. For the purpose of description, blowing machines may be divided into the following classes or types: (1) bellows; (2) piston blowers; (3) fan blowers; (4) rotary blowers; (5) jet blowers.

Bellows. Some form of bellows was probably the earliest form of blowing machine. A very primitive form of bellows is still in use in some Eastern countries, consisting simply of the skin

of some animal sewed into a rude bag, with a valve and nozzle. The older forms of domestic bellows are all constructed on the same principle, viz., a chamber formed of two boards with flexible leather sides, having at one end a nozzle with a narrow mouth; and in the lower board a valve of considerably larger area for the admission of air. When the bellows are distended by drawing the boards apart, air is forced in by atmospheric pressure to fill the volume where the reduced pressure prevails, and then, when the boards are being closed, the valve, which opens only inward, is shut by the compressed air; and the latter, having no other escape, is forced out at the nozzle. The great fault of the common bellows is that it gives a succession of puffs and not a continuous blast. A former remedy for this was to use two bellows, so that one was blowing while the other was filling; but it was afterward found that the double bellows secured a still more uniform blast. This machine is merely the common bellows, with a third board of the same shape as the other two placed between them, so as to form two chambers instead of one. The middle board is fixed, and both it and the lower one have valves placed in them opening inward. A weight on the lower board tends to keep the under chamber filled with air, and when this board is raised by a lever or otherwise, the air which it contains is forced into the upper chamber. The exit pipe is attached to the latter, and a weight is placed on the upper board sufficiently heavy to press the air out in a continuous stream, the continuity being maintained by the large quantity of air always present in the upper chamber, as compared with the size of the exit pipe and the uniform pressure of the weight. Sometimes a spring is used instead of a weight to press out the air. This is the usual construction of the ordinary blacksmith's bellows. Even with the double bellows, however, the constant refilling of the upper portion from the lower prevents the blast from being quite regular, and its use is therefore limited to such simple requirements as are furnished by blacksmiths' forges and domestic fireplaces.

Piston Blowers. The Chinese bellows is one of the earliest and simplest forms of piston blowers. It consists of a square chamber of wood, with a close-fitting piston, which, when drawn back, sucks air in through a flap valve like the ordinary bellows valve, and when pushed forward compresses this air and forces it out through a nozzle. The modern form of piston blower is virtually an air pump or compressor for producing low pressures. (See AIR COMPRESSORS.) Its most extensive use is for supplying the air blast to blast furnaces, Bessemer converters, etc. Steam is the power most commonly used; but gas engines have recently been introduced, and any other power, such as a fall of water, may be employed. A blowing engine of modern construction usually consists of a steam cylinder and an air cylinder set tandem, either vertically, one above the other, or horizontally, one ahead of the other, with a common piston rod and a heavy fly wheel to regulate the operation. The air cylinder is usually placed uppermost in a vertical engine and foremost in a horizontal engine, and the air is usually compressed on both the forward and the return stroke of the piston. Often the steam cylinders are compounded and the air cylinders may compress in two or more stages,

if the pressures are high. The air from the air cylinder passes sometimes into a receiver, but more often directly into the blast pipes, which are made large enough to act as a receiver or reservoir for maintaining a steady supply of air to the furnaces.

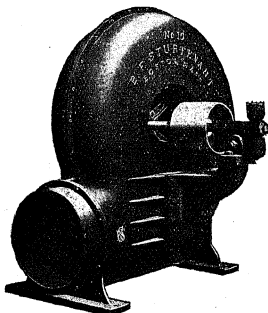
The following are brief descriptions of representative modern blowing engines: A blowing engine built in Philadelphia is a horizontal cross-compound engine, with a high-pressure steam cylinder 44 inches in diameter, a low-pressure cylinder 81 inches in diameter, and two vertical air cylinders each 84 inches in diameter, all with a stroke of 60 inches and making 60 R.P.M. The engine uses steam of 165 lbs. per sq. in. pressure, and the air blast has a pressure of 30 lbs. per sq. in. Vertical blowing engines are often used to supply the blast for blast furnaces. Such engines may have high-pressure steam cylinders 50 inches in diameter, low-pressure steam cylinders 96 inches in diameter, air cylinders 96 inches in diameter, and a piston stroke of 60 inches.

The latest development in blast-furnace blowing is to use blowers driven by gas engines that operate on blast-furnace gas. Engines of this type that develop 1000 horse power each, are in use at the plant of the Lackawanna Steel Company, Buffalo, N. Y., and at Gary, Ind.

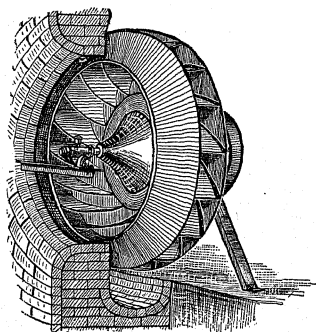
Disk Blowers. Disk blowers consist of an axle carrying several blades arranged something

are built of varying sizes, from 1 foot to 8 feet in diameter, and have a capacity of from 1500 cubic feet to 90,000 cubic feet of air per minute, depending upon their size and the speed at which they are run.

Fans. The general name of "fan" is given to all air machines in which a series of radial



FAN BLOWER.

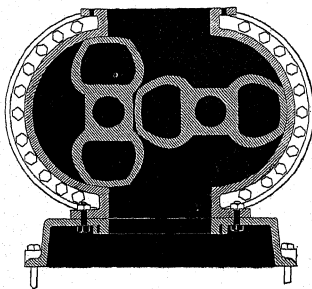


PERIPHERAL DISCHARGE CONE FAN.

like the blades of a screw propeller and revolving concentric with and inside of a cylindrical casing open at both ends. The air current will be parallel to the shaft which drives the fan. This form of blower is used chiefly for ventilating purposes and in such cases is set in the wall of a building with one end of the cylindrical casing opening into the building and the other end opening to the outside air. In this position the axle and blades are rotated by means of an electric motor or belt, and by means of this rotation suck and force the vitiated air from the room into the outer atmosphere. By setting the blower so that it faces into the building, fresh air from the outside may be forced into the room instead of the foul air being drawn out. The familiar "electric fan" is a form of disk or helical blower. Disk blowers

blades or vanes on a revolving axis give a rapid radial rotary motion to the air between them. This rotary motion develops a centrifugal tendency in the revolving air, and it tends to move radially outward and be discharged at the periphery of the wheel. The entry of air is at the centre of the side of the casing and the discharge is in the direction of a tangent. This gives an involute form to such casings. By the use of the high velocities of electric motors or steam turbines, fans can develop high pressures, especially when arranged in series. The Sirocco fan has numerous blades, short radially and long axially. The blades curve forward and give the air a greater velocity than that of the tips of the blades.

Positive Blowers. A form of rotary blower much used is the positive blower, of which



POSITIVE BLOWER.

the Root blower, which is shown above, is a familiar example. This blower consists of

two encased "revolvers," shaped something like a figure 8 and carried by two horizontal shafts, which are connected by gear wheels outside of the casing, so that their relative motion is invariable. These "revolvers" fit the casing closely, and also mesh closely with each other when revolving. As is clearly shown by the engraving, the air is taken in at the bottom of the casing and forced out at its top. These blowers can develop considerably greater pressure than disk blowers.

Jet Blowers. A jet of steam or of water forced through a pipe of small diameter inserted in an air pipe of larger diameter, open at both ends, creates a current of air through the air pipe in the direction of the escaping jet, which is often used for blowing purposes. The most familiar forms of steam-jet blowers are the exhaust nozzles used in the smokestacks of locomotives and fire engines. In these instances the exhaust steam from the engine cylinders is employed to furnish the steam-jet. A water-jet blower, called a *trompe*, was frequently used in the early days of metallurgy to furnish the blast for iron furnaces. In this device a stream or jet of water fell downward through a vertical pipe having openings for the admission of air at its top and terminating at its bottom in an air-tight reservoir. The air sucked in at the top of the pipe by the falling water rises to the top of this reservoir, from which it is piped off for use, while the water remains at the bottom and is drawn off by suitable valves or openings. There are various other forms of blowing machines; but they are of such limited application, or have become so nearly obsolete, that they need not be described here. The modern blowers of greatest importance in mechanical operations are the bellows, the blowing engine, and rotary blowers of the fan, disk, and positive types. Consult Weisbach, *Mechanics of Air Machinery* (New York, 1905), and Kinealy, *Centrifugal Fans* (New York, 1905). See HEATING.

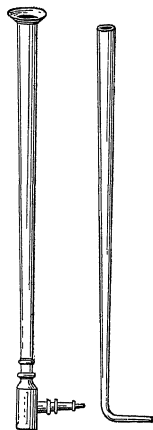
BLOWITZ, blô'vitz, HENRI GEORGES STEPHAN ADOLPHE OFFER DE (1825-1903). A French journalist. He was born at Blowitz, Pilsen, Bohemia, but early removed to France, where he was for many years a teacher of languages at Tours, Limoges, and Marseilles. During this time he became known as a writer on European politics, contributing to the *Gazette du Midi* and other journals. He was naturalized as a French citizen in 1870 and became a warm supporter of Thiers, and for his services in aiding in the suppression of the Commune at Marseilles in 1871 was decorated with the cross of the Legion of Honor. In July, 1871, he began his long career as Paris correspondent of the *London Times*. His services on the *Times* have been noteworthy—in particular his revelation, in 1875, of the plans of the German military party for the second invasion of France, and his publication of the entire text of the Treaty of Berlin before it was signed. He was one of the first newspaper men to see the value of the "interview." Besides having contributed over 4000 columns to the *London Times*, he published *Feuilles volantes* (1858); *Midi à quatorze heures*, a comedy; *l'Allemagne et la Provence* (1869); *Le mariage royal d'Espagne* (1878); *Une course à Constantinople* (1884). Consult his *Mémoires* (Paris, 1903; Eng. trans., New York, 1904).

BLOWPIPE. A conical tube of metal ter-

minating in a small opening and used in the arts for soldering metals and in mineralogy and analytical chemistry for determining the nature of substances. According

to Berzelius, Anton von Swab, a Swedish counselor of mines, first used the blowpipe in 1738 to test minerals and ores. Its use extended from Sweden to Germany and thence throughout the continent of Europe and to England. Cronstedt, Bergman, Gahn, and Berzelius have successively introduced valuable improvements in the form of the blowpipe. The present form, however, is due to Plattner and his successors in the Royal Saxon Mining Academy in Freiberg.

The blowpipe most commonly used in doing analytical work consists of a conical brass tube about 8 inches long, terminating at the wider end in a convenient mouthpiece made of horn or rubber, while at the lower end a small tube with a finely perforated



BLOWPIPES.

nozzle and a platinum tip is inserted at right angles to the larger tube slightly above its end, the space below being intended as a chamber for the moisture from the breath.

When the nozzle of the blowpipe is placed within an ordinary flame and a somewhat strong current of air is blown through it, the flame is projected in a lateral direction as a long pointed cone; the air thus supplied being sufficient for complete combustion, the flame is colored blue and is very hot. If the point of this flame is directed against metals, the latter are rapidly transformed into their oxides, and hence the flame is called an *oxidizing flame*. On the other hand, when the nozzle of the blowpipe is placed near but outside a flame, and a gentle current of air is blown through it, the flame retains its luminosity and, owing to the presence in it of incandescent carbon, is capable of reducing oxides to the metallic state; whence the name, *reducing flame*. See FLAME.

In certain tests the substance is heated before the blowpipe on a piece of charcoal, the formation of colored coatings often indicating the nature of the compound; thus, lead deposits on the charcoal a yellow coating of its oxide. In other tests the substance examined is mixed with reagents, usually borax, sodium carbonate, microcosmic salt, and cobalt nitrate. The first four of these form, with metallic oxides, colored glass-like beads which serve to determine the composition of the substance. With borax, a bottle-green glass bead is obtained when iron salts are present; an amethyst-colored bead indicates manganese, and a blue-colored bead, cobalt. Sodium carbonate and microcosmic salt also yield characteristic colored beads that serve to indicate the presence of certain ingredients. The solution of cobalt nitrate, when applied to a powder on a piece of charcoal, yields charac-

teristic colors for certain compounds that are distinctive, notably the blue coloration for aluminum salts.

Blowpipe analysis is generally used for qualitative determinations, and finds its greatest application in field work as an easy means for determining the composition of minerals. In certain cases, it is possible to make also a quantitative estimation of ores, especially those of silver and lead, by the use of the blowpipe. But the insignificant quantity of the material that is employed renders the result scarcely precise enough for the purpose of technical analysis.

The blowpipe is the common instrument used by goldsmiths and jewelers for soldering metals. It is also used by glass blowers in their work, but in their manipulations the form of the blowpipe is usually the Bunsen blast lamp, in which the heat of the gas flame is increased by a current of air that is supplied from a bellows.

Consult H. B. Cornwall, *Manual of Blowpipe Analysis, Qualitative and Quantitative, with a Complete System of Determinative Mineralogy* (New York, 1891), C. F. Plattner, *Manual of Qualitative and Quantitative Analysis with the Blowpipe*, trans. Cornwall (New York, 1892), Moses and Parsons, *Elements of Mineralogy, Crystallography, and Blowpipe Analysis from a Practical Standpoint* (New York, 1895), F. W. Martin, *Laboratory Guide to Quantitative Analysis with the Blowpipe* (New York, 1903). See ANALYSIS, CHEMICAL, MINERALOGY, OXY-HYDROGEN BLOWPIPE.

BLOWPIPE ANALYSIS See MINERALOGY.

BLUCHER, bluk'er, GERHARD LEBERRECHT VON, PRINCE OF WALLSTADT (1742-1819) A Prussian field marshal. He was born at Rostock, in Mecklenburg-Schwerin, Dec. 16, 1742. At the beginning of the Seven Years' War he joined a regiment of Swedish hussars and in his first action was taken prisoner by the Prussian hussars, whose colonel persuaded him to enter the Prussian service and gave him a lieutenancy. Another lieutenant having been promoted over Blucher's head, the latter immediately wrote to Frederick the Great as follows: "Von Jagersfeld, who has no merit except that of being the son of the Margrave of Schwedt, has been put over my head. I beg to request my discharge." Blucher was put under arrest, and after repeated applications for discharge he received from Frederick the curt intimation: "Captain Blucher is at liberty to go to the devil!" Blucher betook himself to his estate at Gross-Radow, in Pomerania, and devoted himself to farming, but soon tired of bucolic life and in 1787 rejoined the army. He fought as colonel of hussars against the French on the Rhine, earning great ability as a leader of cavalry. In the campaign of 1806 he took part as lieutenant general in the battle of Austerlitz. Blucher, with the greater part of the cavalry, covered the retreat of the Prince von Hohenlohe through Pomerania. He was accused of not giving the Prince due support and thus causing the capitulation at Prenzlau. Blucher marched into the territory of the free town of Lubeck, and hastily fortified the city, but the French took it by storm, and he was forced to surrender on the plain of Ratkow, near Lubeck, whither he had escaped with a few troops. A fortnight later he was exchanged for the French General Victor and immediately on his arrival in Königsberg was sent at the head of a corps to assist in the defense of Stralsund. After the Peace

of Tilsit he was employed in the War Department in Königsberg and Berlin and subsequently became commandant of Pomerania. At a later period he was placed on the retired list, together with several other men of note, at the instance, it was said, of Napoleon. He was one of the few to combat the general belief in the invincibility of Napoleon, which had grown into a sort of fatalism in high places. In common with Stein and Hardenberg, he labored to remove all weak and unpatrotic counselors from about the King. When all the leaders of the army lost courage, his constancy revived confidence and made him the centre of all hope for the future. When his countrymen at last rose against the French in 1813, Blucher was appointed to the chief command of the Prussians, reinforced by General Winzingerode's Russian corps. At the battles of Lützen, Bautzen, and Haynau he displayed heroic courage. At the Katzbach he defeated Marshal Macdonald and cleared Silesia of the enemy. In vain did Napoleon himself attempt to stop the "old captain of hussars," as he called him, in his victorious career. In the battle of Leipzig he won a great advantage over Marshal Marmont, at Mockern, Oct. 16, 1813, and on the same day pressed on to the suburbs of the city. On the 18th, in conjunction with the Crown Prince of Sweden, he had a large share in the defeat of the French, and on the 19th his troops were the first to enter Leipzig. Opposing the policy of Austria, Blucher insisted that the taking of Paris was the end to be sought. On the first day of January, 1814, he crossed the Rhine, garrisoned Nancy on the 17th of the same month, and, after winning the battle of La Rothière, pressed forward toward Paris. But his scattered corps were routed by Napoleon, and he fought his way back to Châlons with great loss. On March 9, however, he defeated Napoleon at Laon, and at the end of the month, after being joined by Schwarzenberg and his corps, he again advanced toward Paris. The day of Montmartre crowned the brilliant deeds of this campaign, and on March 31 the Allies entered the French capital. Blucher himself, who was suffering from a malady of the eyes, abstained from entering the city on that day. Frederick William III created him Prince of Wahlstadt, in remembrance of the victory at the Katzbach, and gave him an estate in Silesia. In England, whither he followed the Allied sovereigns, he was received with an enthusiasm never before excited by a German. The University of Oxford conferred on him the degree of doctor of law. After Napoleon's return from Elba, in 1815, Blucher once more assumed the general command and promptly led an army into the Netherlands. On June 16, 1815, he lost the battle of Ligny and narrowly escaped being killed by his horse falling on him. The victory of the Allies in the battle of Waterloo was decided by Blucher's timely appearance on the field. He ordered his Prussians to pursue the flying enemy, which they did the whole night. Declining the offered truce, Blucher marched against Paris, and on the second taking of that city manifested a strong desire to retaliate on Paris the spoliation that other capitals had suffered at the hands of the French, but he was held in check by the Duke of Wellington. In order to reward Blucher's services to Prussia and the common cause, Frederick William III created the Order of the Iron Cross, the badge of which consisted of an iron cross

surrounded by golden rays. On Aug. 26, 1819, a colossal bronze statue was erected in his honor in his native town. Blucher died Sept. 12, 1819, after a short illness, at his estate of Krieblowitz, in Silesia. Consult: Scherr, *Blücher, seine Zeit und sein Leben* (Leipzig, 1887); Varnhagen von Ense, "Fürst Blücher von Wahlstadt," vol. iii of the *Biographische Denkmale* (Leipzig, 1872); Von Colomb, *Blücher in Briefen aus den Feldzügen, 1813-15* (Stuttgart, 1876); Henderson, *Blücher and the Uprising of Prussia against Napoleon* (New York, 1911).

BLUDOV, блудов, DIMITRI NIKOLAYEVITCH, Count (1785-1864). A Russian statesman, born in the government of Vladimir. He studied in Moscow, entered the diplomatic service in 1800, in 1826 was appointed Secretary of State under Nicholas I, in 1832 became Secretary of the Interior, in 1839 became a member of the Imperial Council, and in 1842 received the title of Count. He worked unceasingly for the welfare of the peasants. As Minister of Justice he obtained two ukases (1842, 1847) for the amelioration of the condition of the serfs, and as President of the Imperial Council and of the Council of Ministers he set his signature to the act abolishing serfdom. For his biography, consult Kovalevsky, *Count Bludov and his Times* (St. Petersburg, 1866).

BLUE (from Fr. *bleu*, in itself borrowed from the Germanic nations; OHG. *blao*, AS. *blow*, Ger. *blau*). A primary color of the same shade as the clear sky and the turquoise, and located in the solar spectrum after the green and before the violet. This color has been conspicuously used as a badge to designate military bodies. It was the favorite color of the Scottish Covenanters in the seventeenth century, when it was called "true blue," and is the color commonly worn by the soldiers of the United States army for dress uniforms. The sailors of most navies are dressed in uniforms of a darker color, called *navy blue*. Among blue minerals the sapphire and the turquoise are highly valued as gems; the lapis lazuli has been extensively used for ornamental purposes. The coloring matter of blue flowers is due to a pigment called *anthocyanin*. Among the more important blue pigments are the following: *Antwerp blue*, a mixture of Prussian blue and alumina; *azure blue*, a cobalt oxide fused with glass and ground to powder; *Berlin blue*, another name for both Antwerp blue and Prussian blue, *bies blue*, originally native azurite powdered and washed, more commonly, however, a preparation of smalt; *Bremen blue*, chalk or whiting mixed with a solution of copper in nitric acid; *China blue*, crude cobalt oxide ground with potash and mixed with feldspar, fused, and powdered; *cobalt blue*, 10 parts of aluminum mixed with 1 part of a cobalt salt, slowly dried, and heated to a dull redness and ground to powder; *king's blue*, a cobalt carbonate; *mountain blue*, native copper carbonate or azurite; *mineral blue*, a synonym for Antwerp blue; *Paris blue*, a synonym for both cobalt blue and Prussian blue; *Prussian blue* is ferrie ferrocyanide made by adding potassium ferrocyanide to a solution of ferrous sulphate, and the resulting precipitate oxidized, washed, and dried; *queen blue*, a synonym for lump blue used in laundries (bluing); *Saunders blue*, ultramarine ashes obtained from the resinous mass in making ultramarine; *Saxon(y) blue*, Prussian blue and aluminum hydrate; *smalt*, a cobalt ore heated with flint and potash

and ground to a powder; *Thénard blue*, a synonym for cobalt blue; *ultramarine*, originally prepared from lapis lazuli, but now made synthetically by heating together kaolin, sodium sulphate, sodium carbonate, sulphur, and charcoal, then pulverizing, washing, and drying. Among the dyestuffs that yield a blue color are the following, the origin of many of which is indicated by their names: *alizarin blue*; *aniline blue*; *anthracene blue*; *chemo blue*, a solution of indigo; *Couper's blue*, derived from induline; *dahlia blue*, derived from rosaniline; *diamine blues*; *ethylene blue*, derived from diethylaniline; *indigo blue*, originally derived from the indigo plant and now made synthetically; *logwood blue*, an extract of logwood; *methylene blue*, derived from methylaniline; *night blue*, derived from rosaniline; *resorcin blue*, derived from phenol; *soluble blue*, derived from rosaniline; *sulphur blues*, and *Victoria blue*, derived from rosaniline.

BLUE, RUPERT (1857-). An American sanitarian and public official, born in Richmond Co., N. C., a brother of Victor Blue. He attended the University of Virginia in 1889-90 and studied medicine at the University of Maryland in 1892. He was promoted through the various grades in the government health service until in 1912 he became surgeon-general. In 1910 he took a course at the London School of Tropical Medicine. He served in many of the largest cities of the United States and in Genoa, Italy. In 1903-04 he was in charge of operations for the eradication of the bubonic plague in San Francisco, and in 1905 he served through the epidemic of yellow fever in New Orleans. He was director of sanitation at the Jamestown Exposition in 1907, and in that and the following years directed a second campaign against the bubonic plague in San Francisco.

BLUE, VICTOR (1865-). An American naval officer, born in North Carolina, a brother of Rupert Blue. He graduated at the United States Naval Academy at Annapolis in 1887, served on the *Suwanee* in the Spanish-American War, and attracted general attention in June, 1898, by penetrating 72 miles within the Spanish lines in the vicinity of Santiago, Cuba, and definitely determining for the first time the presence of the Spanish fleet in Santiago harbor. He commanded the *Albatross*, a gunboat captured from the Spanish, in the attack upon Manzanillo; became flag lieutenant in the Pacific Squadron, and served in the Philippines in 1900-01. From the rank of inspector of ordnance, held in 1905-07, he was promoted until he became commander in 1909 and in 1910 chief of staff in the Pacific fleet. Soon thereafter he was transferred to duty on the General Board of the Navy Department.

BLUEBACK. The name of various fishes having bluish backs; specifically, the Fraser River salmon (*Oncorhynchus nerka*), of the northwest coast of America. See SALMON.

BLUEBEARD. A fictitious hero of the familiar tale which in the eighteenth century found its way into English from the French of Charles Perrault (c.1697). In this story the Chevalier Raoul, whose surname is due to the color of his beard, had married seven wives. Six of these had mysteriously disappeared, and the seventh is represented as subjected to a singular test of obedience. Having occasion to go away, Raoul commits to Fatima the keys of his castle, and enjoins her that, though she may otherwise have free course, she must not open

a certain chamber Her curiosity is enhanced by her loneliness and proves too strong for her Opening the door, she beholds the charnel house where lie the bones of her predecessors Her lord returns, discovers her disobedience by the blood upon the key, and tells her that in five minutes she must die From the top of the castle, however, her sister Anne observes horsemen approaching in the distance, who are the brothers of the ill-fated wife, and they arrive just in time to rescue their sister by slaying Bluebeard Though Bluebeard is imaginary, there is thought to be a historic prototype in Gilles de Laval, Baron de Retz (1396-1440). He fought like the brave man he was against the English in their invasion of his country, but his intrepidity pales before his diabolical cruelties, and it is by these that he is remembered Because of some disloyalty to the Duke of Brittany, he was burned alive near Nantes in 1440 That Laval is the original of Bluebeard is conjecture at best, and from the fact that the story is found with more or less variety of detail in the folklore of different peoples, this doubt is enhanced

Besides the French version of Perrault, there are tales of a similar kind in Straparola's *Proverbi notti* (1569) and in the *Pentamerone* of Gian Alessio Abbatutis There is at Morbihan an interesting pictorial representation in some frescoes of the thirteenth century, mentioned by Violeau in his *Pelerinages de Bretagne* And it has been pointed out that the resemblance is very close to the Arabian Nights' tale of the Third Calender In his *Phantassus* Tieck has wrought the matter into a clever drama, G  try has, in his *Raoul Barbe-Bleue* (1789), given it the setting of comic opera, Offenbach produced his op  ra bouffe, *Barbe-Bleue*, in 1866, and the younger Coleman brought out *Bluebeard*, or, *Female Curiosity* (1798) Consult Wilson, *Bluebeard A Contribution to History and Folklore* (New York 1899), Hartland, "The Forbidden Chamber," in *Folklore Journal* (London, 1885), Abb   Bossard, *Gilles de Rais dit Barbe-Bleue* (Paris, 1886), Perrault, *Contes de ma m  re* *VOYE*, tr by Sombier, ed Lef  vre (Paris, 1875)

BLUE BEECH See HORNBEAM

BLUE/BELL. A name given to *Campanula rotundifolia*, a plant occurring throughout the Northern Hemisphere, on account of its blue bell-shaped flowers The specific name (*rotundifolia*) seems inappropriate, unless the root leaves are seen, the stem leaves being linear or lanceolate These flowers are often found among snow and ice The name "harebell" is often given to this species, and "bluebells of Scotland" is a name very commonly used The name "bellflower" is used for the whole genus *Campanula*, with about 250 species See CAMPANULA, CAMPANULACEAE

BLUE/BILL. A scaup duck See SCATP

BLUE/BIRD A small, widely distributed, and familiar North American bird (*Sialia sialis*), which is much the same sort of favorite in the United States that the redbreast is in England, it is, indeed, locally known as "blue robin" Except in the Southern States, it is chiefly known as a summer bird of passage, appearing very early in spring, and visiting again "the box in the garden, or the hole in the old apple-tree, the cradle of some generations of ancestors" In size the bluebird is much smaller than most of the other thrushes, being about 7 inches long The upper parts are rich sky-

blue, the throat and breast reddish chestnut, and the belly white The female is duller in color than the male The bluebird lays five or six pale-blue eggs and often has two broods in the season Its song is "a soft, agreeable warble" The male is remarkably attentive to his mate, and both exhibit extraordinary courage in driving away intruders from the vicinity of their nest, yet it is greatly disturbed, and in some places has been nearly expelled from villages, by the English sparrows See Plate of SONG BIRDS accompanying THRUSH

In the Rocky Mountains and westward its place is taken by very similar species, differing chiefly in the absence of chestnut on the throat or the entire ventral plumage, this color being replaced by blue

Several other birds prevalingly blue receive the name in other lands, such as the Oriental "fairy bluebirds" of the genus *Irena*, especially *Irena puella*, one of the East Indian bulbuls

BLUE BIRD, THE (*L'Oiseau Bleu*) A fairy play by Maurice Maeterlinck, published in 1908 Under the guise of a dream vision of two children the drama is a story of the search for happiness, typified by the Blue Bird The fairy Berylune gives the children, Tytyl and Mytyl, a jewel by which the familiar things of home, bread, sugar, water, light, the cat and dog, assume personal forms and join in the search for the Blue Bird Light, bold and fearless, Water, shrinking and timid, Bread, a fat, jolly person, the Dog, faithful and affectionate, and the Cat, fawning and treacherous, take the leading parts They visit the Land of Memory, the Palace of Night, the Palace of Happiness, and the Kingdom of the Future, thinking vainly they see the Blue Bird, only to find it at last in their own home But beneath the charming story is a deeper symbolism The Blue Bird stands not merely for happiness, but for heavenly truth, through which the former may be gained The children typify humanity, searching for truth through the past, the somber present, and the hopeful future The play was produced in London in 1910, and in New York, at the New Theatre, the same year

BLUE BOOK A term broadly applied to published reports on special topics issued by the legislature of a country, or more commonly by the various executive departments of a government Specifically the name is given to publications of this character printed by the British government for the information of Parliament They are commonly bound in blue covers In the same manner France has its Yellow Books, Italy its Green Books, and Spain its Red Books In the United States the name "Blue Book" is given to the published lists of government employees and to the manual of regulations for the navy, while the foreign diplomatic correspondence is usually published in Red Books

BLUE/BOTTLE. A plant See CENEAUREA
BLUE/BOTTLE A very large flesh fly, prevalingly blue, as, especially, *Lucilia caesar* of the northern United States For habits, see FLESH FLY

BLUE/BUCK, or BLUE/DUIKER, called by the Dutch Blaauwbok, but not to be confused with the extinct antelope of that name The pigmy antelope (*Oephalolophus monticola*), of Natal, one of the smallest of the duikerboks "These tiny creatures," says Lydekker, "which swarm in the Natal jungles, and stand only 13

inches at the shoulder, are smaller and lighter in build than a hare, and are of a blue mouse color, with the tiny straight horns scarcely showing above the tuft of hair." They feed mostly on berries and leaves and are extremely active and agile, even climbing trees of a favorable character. They feed in the densest forests during the day and rest at night. The alarm cry is a sharp, whistling shriek. For an extensive account of the habits of these and related species, consult *Proceedings of the Zoological Society of London* (1899, p. 830), and Selater, *Fauna of South Africa, Mammals*, vol. ii. See **DUIKER**.

BLUE CARDINAL. See **LOBELIA**.

BLUE-COAT SCHOOL. A nickname for Christ's Hospital, London, suggested by the long blue cotton coat worn by its students. Originally it was of russet, but after the first year (1552) it was changed to its present color. See **CHRIST'S HOSPITAL**.

BLUE EARTH. A city and the county seat of Faribault Co., Minn., 130 miles south by west of St. Paul, on the Chicago, St. Paul, Minneapolis, and Omaha Railroad, and on the Blue Earth River (Map: Minnesota, C 7). Farming, dairying, and stock raising are the principal industries, and there are cement works, flour mills, and a broom factory. The city has a public library and owns its water works and light plant. Pop., 1900, 2900; 1910, 2319.

BLUE-EYE (the bird is blue-faced). A beautiful species of honey eater (*Entomyza cyanotis*), abundant in New South Wales. It is a bold, spirited, and graceful bird, with the habits and food of the honey eaters and frequenting eucalyptus trees. It prefers, whenever it can, to deposit its eggs on the big, deserted, dome-shaped nest of a related starling-like bird (*Pomatoharus*, or *Pomatostomus, temporalis*); never within the dome, but in a neat round depression on top. Consult Gould, *Birds of Australia* (London, 1842-50); Campbell, *Nests and Eggs of Australia Birds* (Sheffield, 1910).

BLUEFIELD. A city in Mercer Co., West Va., 106 miles west of Roanoke, Va., on the Norfolk and Western Railroad (Map: West Virginia, C 4). It is the seat of a State normal school and contains two sanitariums, an opera house, and a fine Federal building. Bluefield has large railway shops, flouring mills, large wholesale houses, and important coal-mining interests, the city being the gateway of, and the distributing centre for, the vast Pocahontas coal fields. Limestone, clay, iron ore, and timber are found. Bluefield was settled in 1888 and was first incorporated in 1893. It has adopted the commission form of government. Pop., 1890, 1775; 1900, 4644; 1910, 11,118.

BLUEFIELDS. A seaport town of Nicaragua, on the Mosquito Coast, near the mouth of the Bluefields River, in the Bluefields Lagoon (Map: Central America, F 5). It is the seat of a United States consular agency, of a court of justice, and of a Moravian mission. The landlocked harbor afforded by the lagoon is connected by regular steamship lines with ports of the United States and is of considerable commercial importance, having a trade in bananas and other tropical fruits. Pop., 1906, 4706. Bluefields has been the scene of disputes between England and Nicaragua.

BLUEFIELDS, or BLEWFIELDS. A river of the Mosquito Reservation, Nicaragua, Central America. It rises on the eastern slope

of the mountains in the department of Chontales, flows generally eastward, and empties into the Bluefields Lagoon, an arm of the Caribbean Sea. It is navigable for large steamers to Rama, a distance of about 65 miles from its mouth. A town of the same name lies at the mouth of the river and is the shipping centre of an important fruit trade.

BLUE/FIN. See **BLACKFIN**.

BLUE/FISH (so called from its bluish or greenish color). A well-known food and game fish (*Pomatomus saltatrix*) of wide distribution, common in summer along the eastern coast of the United States. It is the sole representative of the family Pomatomidae and closely allied to the mackerels. It occurs in nearly all warm seas, including the Mediterranean (south shore), but is absent from British waters and from the vicinity of Bermuda and the western islands. Along the southern United States coast it is called "skipjack," or "skip mackerel," and the young are called "snappers."

Bluefish may be found more or less all the year off the eastern coast of the United States, but become abundant in May, when they pursue the schools of fishes seeking inshore spawning grounds. As to their own reproduction little is known; it is regarded as certain that they do not spawn in inshore United States waters, unless, as some believe, they do so in the Gulf of Mexico. The young fish that first appear in northerly waters in August are about 5 inches long, but they grow with great rapidity, becoming 12 or 15 inches long by the next year. They increase after that even more rapidly. It is on record that one of 25 pounds has been taken in Buzzard's Bay, Mass.; but examples of 10 pounds are heavy, and the ordinary catch is from 2 to 5 pounds. A 3-pound fish is about 21 inches long; one of 8 pounds, nearly 30 inches. The color is bluish or greenish above and silvery below, with a black blotch at the base of the pectoral fin. (For the form, see Colored Plate of AMERICAN FOOD FISHES, accompanying FISH AS FOOD.)

The bluefish is a voracious feeder upon fish—the most destructive and remorseless bandit of the northern seas. "Going in large schools, in pursuit of fish not much inferior to themselves in size," writes Prof. S. F. Baird, "they move along like a pack of hungry wolves, destroying everything before them. Their trail is marked by fragments of fish and by the stain of blood in the sea; as where the fish is too large to be swallowed entire. . . . It kills many more than it requires for its own use." The excessive voracity, which characterizes the young as well as the old, is a very serious factor in the mortality of the sea and undoubtedly diminishes in an extensive and persistent way the numbers of many other gregarious fishes, and particularly of the menhaden. They are also very fond of squid; also of certain kinds of marine annelids; and as these animals are the favorite food of several other fishes, their diminution is another indirect effect of the general destruction of fish life to be charged to the bluefish. They sometimes ascend the larger rivers; going up the Hudson, for instance, as far as the tide sets.

The bluefish is regarded in the Northern States as one of the very best table fish. The wholesale dealers of New York alone handle from 4,000,000 to 5,000,000 pounds annually, worth \$250,000 to \$300,000. Large quantities are taken in weirs or pounds from the eastern

end of Long Island to Cape Cod, and still greater quantities by gill nets. See FISHERIES

The sport of bluefishing is perhaps the foremost in American marine angling. One mode of capture is by trolling, but as in that method the boat is moving and the fish hooks itself, it gives little sport. Excitement in capture is easily obtained by "clumming," wherein the boat is anchored, and the fish are attracted to it by throwing overboard small pieces of menhaden, with which the hook is only baited. The bluefish is then handled on a rod. Another common method is by heaving a heavy jig from the shore and dragging the fish up the beach. Other anglers prefer to use a light rod and an artificial minnow from a stationary skiff, or to fish with shrimp bait from the wharves in quiet bays, where young bluefish resort.

BLUE FLAG See IIS

BLUE/GILL A local name of the blue sunfish of the Mississippi valley. See SUNFISH

BLUE/GOWNS A name commonly given to the bedesmen or beadsmen of the Scottish kings. In ancient times, a beadsman was a person employed to pray for another (See BEAD). From this practice sprang up a custom in Scotland of appointing beadsmen with a small royal bounty, who ultimately degenerated into a class of authorized mendicants. On his Majesty's birthday each beadsman received a gown of blue cloth (hence the name), a loaf of bread, a bottle of ale, and a leather purse containing a penny for every year of the King's life. Every birthday, another beadsman was added to the number. The most important part of the privilege was a large pewter badge, attached to the breast of the gown, which, besides the name of the bearer, had the inscription, *Pace et repas*. This implied the privilege of begging and bespoke the kindly consideration of all to whom the beadsman appealed. The practice of appointing beadsmen was discontinued in 1833. May, 1863, is the date of the last allowance drawn by a beadsman from the Exchequer in Edinburgh.

BLUE GRASS, KENTUCKY BLUE GRASS, JUNE GRASS, SPEAR GRASS, or MEADOW GRASS, *Poa pratensis* A species common in the cooler parts of the United States, Europe, and Asia. It grows well upon almost any soil not too sandy, but attains its best development upon clay soils overlying limestone. In the United States it grows in great perfection in the limestone regions of Kentucky and Tennessee, the famous Blue Grass Region of the former being named for that fact. Blue grass, while furnishing hay of excellent quality upon good soils, does not yield a large quantity, and on this account it is less valuable for hay than as a pasture and lawn grass. It is a perennial, attaining a height of from a few inches to 2 feet, with an abundance of long, narrow, soft root leaves. It spreads with rapidity by means of its rootstocks, soon forming a dense sod. On this account it stands pasturing well, the ordinary tramping of stock not injuring it to any extent. Blue grass should enter into every mixture for permanent pastures in the eastern and middle United States. The seed, as marketed, usually contains much chaff and is of low vitality, hence it should be sown rather thickly. To make a good firm sod, about three years are required, after which little attention is necessary. This grass does not do well in the warmer parts of the Southern States. In the South the

Texas blue grass, *Poa anachnifera*, replaces it. It is closely related to the Kentucky blue grass, differing from it principally in its more vigorous growth and having its "seed" more or less covered with wool. This grass is propagated by seed or by setting out portions of sods, the woolly seed making sowing difficult. It spreads rapidly and promises to become one of the best grasses for the regions to which it is adapted. Texas blue grass withstands drought better than the former species. Kentucky blue grass seed is often adulterated with the seed of Canada blue grass (*Poa compressa*). While this species has some good qualities, it is much inferior for lawns and pastures. Kentucky blue grass has the following percentage composition: water, 65.1, proteid matter, 4.1, f. t. l. 3, nitrogen-free extract, 17.6, crude fibre, 9.1, mineral matter, 2.8.

Its feeding value, like that of other grasses, depends chiefly on its nitrogen-free extract, crude fibre, and protein content. It is a wholesome and nutritious feed, relished by all kinds of stock. Hay made from this grass, cut when the seed is in the milk stage, contains, on an average per cent, water, 24.3, proteid matter, 6.3, fat, 3.6, nitrogen-free extract, 34.3, crude fibre, 24.6, and mineral matter, 7.0. Hay made from grass cut when the seed is ripe contains, on an average, a little less nutritive material. See Plate of Grasses.

BLUE-GRASS STATE Kentucky. See STATES, POPULAR NAMES OF

BLUE-GREEN ALGÆ See CYANOPHYCEÆ

BLUE GUM See EUCALYPTUS

BLUE-HEN STATE Delaware. See STATES, POPULAR NAMES OF

BLUE HILL OBSERVATORY (Lat 42° 13', long 71° 7', alt 635 feet) A meteorological observatory, at the summit of the Great Blue Hill, near Boston, Mass., founded in 1885 by A. Lawrence Rotch (1861-1912) of Boston and maintained by him until 1912, when, upon his death, the observatory and its grounds became the property of Harvard University. The work of Mr. Rotch and his assistants was directed mainly to the study of cloud phenomena and the exploitation of the upper atmosphere by means of kites carrying self-registering instruments. The records of the observatory and results of its investigations are published in the *Annals of the Observatory of Harvard College*. Blue Hill is one of the few stations in the world where meteorological observations of nearly every element have been continuously recorded under favorable and identical conditions for a long time. Consult an article by Waldo in *Popular Science Monthly*, vol. lxx (1901) and by Rotch in *Technology Review*, vol. xii, no. 2 (1910). Consult also Rotch, *Sounding the Ocean of Air* (1900).

BLUE ISLAND A city in Cook Co., Ill., 2½ miles south of the city limits of Chicago, on the Calumet River and on the Illinois Central, the Chicago, Rock Island, and Pacific, the Chicago and Grand Trunk, and the Baltimore and Ohio Chicago Terminal railroads (Map Illinois, E 2). It is a popular suburb of Chicago, is an important railroad and commercial centre, and has brickyards, stone quarries, breweries, wire works, smelting works, etc. Settled in 1833, Blue Island was incorporated as a village in 1872. It was the storm centre in the early phase of the great railway strikes of 1894, which tied up the traffic of half the country and led to the sending of United States troops to Chicago and elsewhere.

The government is administered under a charter of 1901, which provides for a mayor, biennially elected, and a city council. The water works are owned and operated by the municipality. Pop., 1890, 3329; 1900, 6114; 1910, 8043.

BLUE JAY, SHARK, TIT, etc. See the substantives.

BLUE KNIGHT, THE. Sir Persaunt of India, the fourth of the brothers, the Black, Red, Green, and Blue Knights. Sir Beaumains, or Gareth, conquers him in chap. 131 of Malory's *Morte d'Arthur*. He is spoken of as "The Blue Knight" in chap. 133.

BLUE LAWS. In general, any laws which impose vexatious restrictions on the freedom of members of the community and interfere with their ordinary habits or which aim to regulate their private morals; sumptuary laws. Specifically the name came to be applied to a body of regulations of this character supposed to have been in force in the Colony of New Haven, Conn., about the middle of the eighteenth century. The supposition is based upon the well-known fact that in the Puritan days the personal conduct of citizens was often subject to a close judicial supervision and that the sin of Sabbath breaking was especially odious to the magistracy. A Tory minister, the Rev. Samuel A. Peters, who had charge of the English churches in Hartford and Hebron, but who was compelled by the Revolution to flee to England, published there, in 1781, a book entitled a *General History of Connecticut*, a work whose exaggeration and spite are so obvious as to deprive it of all authority. Some years later a small book containing these supposed laws, which were really extracts from Peters's history, was published, and was until a comparatively recent date regarded as a correct statement of the early law of the Colony. When modern historical research had discredited the authority of this work, it was for a time believed that the Blue Laws were invented out of hand by Peters and had no existence in fact; but more recent investigations have shown that, although many of them are not to be found in the New Haven statute books, all except two or three out of the 45 are to be found either in the works of an earlier writer (Neal) or, with slight modifications, in the statute books of the various New England Colonies. Consult "An Examination of Peters's Blue Laws," by W. F. Prince, in the *Annual Report of the American Historical Association* for 1898, and J. H. Trumbull, *True Blue Laws of Connecticut and New Haven; and the False Blue Laws Invented by Rev. Samuel Peters* (Hartford, 1878).

Blue Laws of Hawaii, a compilation of Hawaiian statutes, largely of a paternal character, promulgated in 1840 by Kamehameha III. These laws were due to missionary influence and were obnoxious to the native population of the islands because of their interference with the ancient customs and habits of the people. They were republished in 1894 under the title of *Hawaii's Blue Laws*.

BLUE LIGHT, **BENGAL LIGHT**, or **BENGAL FIRE**. A brilliant signal light used at sea to attract attention, give warning, etc., and in ordinary pyrotechny for illuminating a district of country. It is prepared from the following materials reduced to fine powder, thoroughly dried, and intimately mixed in the following proportions by weight: nitre, 6; sulphur, 2; tersulphuret of antimony, 1. As the fumes evolved during its combustion contain a poisonous oxide

of antimony, the light cannot be used with safety in inclosed spaces.

BLUE LIGHT. The visible chemical frequencies of the spectrum have recently been successfully used in treating lupus, acne, eczema, carbuncle, and ulcer. An arc lamp of 5000 candle power is used, back of which is a reflector to throw the light on a large screen of cobalt glass, placed several feet from the lamp. The patient is seated a few inches to a foot from the screen, and the time of exposure varies up to a half hour. In neuralgia and eczema excellent results have followed exposure to dark-blue incandescent light of 50 candle power. See **PHOTOTHERAPY**.

BLUE LIGHT. In American political history, a name applied to a member of that faction of the Federalist party (q.v.) which opposed the War of 1812. It was derived from the fact, or alleged fact, that when Decatur, with two frigates, was blockaded by a superior English fleet in the harbor of New London, Conn., in 1813-14, certain Federalists warned the English commander by burning blue lights at the entrance of the harbor each time the Americans attempted to get to sea under cover of darkness.

BLUE MANTLE (from the color of his robe). The title of an English pursuivant (q.v.).

BLUE MON'DAY. A name originally referring to a custom in parts of Europe, especially in Bavaria, in the sixteenth century, of decorating churches in blue colors on the Monday preceding Lent, when the people celebrated the carnival festivities, but the excesses committed led to the legal abolition of the custom. In the United States it is the custom of some women of the poorer class to call every Monday by this name, as it is the day generally set apart for the week's laundry work.

BLUE MOUNTAINS. The name of several mountain chains in New South Wales, Australia, Jamaica, West Indies, New Jersey, Pennsylvania, and Oregon. 1. The Blue Mountains of New South Wales run nearly parallel with the coast and form a part of the complex cordillera of Australia, which extends from Cape York on the north to the Grampians on the south. They are composed of horizontal sandstone strata broken by canons and deep gullies and present a precipitous front towards the east. The highest point of the Blue Mountains, Mount Bearnang, is about 4100 feet high. They are crossed by a railway which affords communication between Sydney and the rich pasturage and mining regions of the interior (Map: New South Wales, E 4). 2. The Blue Mountains of Jamaica traverse a considerable part of the length of the island from east to west and attain an extreme altitude of 7350 feet. 3. The Kittatinny and the Shawangunk mountains forming the second ridge of the Appalachian Mountains in New York, Pennsylvania, and New Jersey are also called the Blue Mountains. These are to be distinguished from the Blue Ridge. 4. A range in northeastern Oregon extending slightly northward beyond the Washington boundary line. Its flanks are well forested with fir and pine.

BLUE NILE. See **NILE**.

BLUE NOSE. A nickname for the Nova Scotians, from the effect of the climate, or from a potato called "Blue Nose" raised in that region.

BLUE PETER (blue + *'peter*, for *repeater*). A rectangular blue flag with a white centre of similar shape, but of about one-fourth of the dimensions. It is the letter "P" of the inter-

national marine code (see SIGNALS, MARINE), when hoisted alone at the fore (i.e., at the fore truck, or top of the foremast), it signifies that the vessel will shortly sail or is ready to sail. In the United States navy a flag called the cornet takes the place of the blue peter as a sailing signal.

BLUE PILL (*Pisula hydrargyri*) The most simple form in which mercury can be administered internally. It consists of two parts of mercury with three parts of conserve of roses, to this is added powdered licorice root.

In cases of torpid condition of the liver or inflammation of that organ, blue pill is much used as a purgative, either alone or combined with some other drug, such as rhubarb. As a purgative, the usual dose of blue pill is one or two pills of five grains each, followed some hours later, by a saline draught, such as a Seidlitz powder. There is always danger of salivation, with the accompanying deterioration of gums and teeth, and the medicine should be taken only when ordered by a physician. It is recorded that a blue pill taken on each of three successive nights caused fatal salivation. Many proprietary purgative pills contain metallic mercury.

BLUE PRINT, or **CYANOTYPE** (Gk *kyanos*, *kyanos*, dark-blue + *typos*, *typos*, impression) **PROCESS** A photographic process discovered by Sir John Herschel, in which certain cyanides are used. The process is based on the reduction of a ferric salt to a ferrous salt by the action of light in the presence of organic matter. In the practical application of the process two solutions containing respectively one part of ammonium ferric citrate in four parts of water, and one part of potassium ferrioxanide in four parts of water, are mixed, filtered, and preserved in a dark room. A good quality of paper is then coated with the mixture by means of a brush or sponge or by floating the paper for two minutes on the mixture. The paper is then left in a dark place to dry. If exposed under a negative or tracing to the sun, or an intense arc light for 10 or 12 minutes, and then washed in water and dried, the paper will show the picture or drawing in white on a blue ground. To obtain prints of a similar nature of warm brown tones, the mixture employed is prepared by adding a solution of 50 grains of uranium sulphate in two ounces of water to a solution of 120 grains of potassium ferrioxanide in two ounces of water. Various modern processes have been developed whereby dark lines may be obtained on a light ground.

BLUE RACER See BLACK SNAKE

BLUE RIBBON ARMY. The name adopted in England by a society of total abstainers, from the blue badge worn by the members. Since 1883 the society has been known as the "Gospel Temperance Union." The organization originated in America in 1878, where it was known from its founder as the Murphy Movement. See TEMPERANCE.

BLUE RIDGE. The name of the most easterly range of the Appalachians in the United States (Map United States, eastern part, L 3). It forms an almost continuous chain from West Point in New York (the Highlands) down to the north of Alabama, through New Jersey (Schooley's Mountain), Pennsylvania (South Mountain), Virginia, the Carolinas, and Georgia. In New Jersey and Pennsylvania the name of Blue Ridge is sometimes, but inaccurately, ap-

plied to the "second" range, properly the Blue (or Kittatinny) Mountains, which runs parallel with this and is separated from it by a part of the Great Valley. The Blue Ridge proper refers especially to that part of the range below Pennsylvania, which separates the Great Valley from the Piedmont Region. In south Virginia the range widens into a broad plateau, which reaches its widest extent in North Carolina, where it is intersected by numerous groups known as the Black, Cowee, Nantahala, and South mountains. These groups run transverse to the main axis of the Blue Ridge, and their valleys are occupied by numerous streams with a general northwesterly course. The Black Mountains include the highest summits of the range as well as of the Appalachians. Mount Mitchell, or Black Dome, the loftiest point, is 6711 feet. Balsam Cone, Black Brothers, Mount Buckley, Mount Gibbs, and several others are over 6500 feet. Towards the north the Blue Ridge falls off in elevation, in Virginia the summits are about 4000 feet, and in Pennsylvania and New Jersey they are much less. The range is crossed by several large rivers, flowing through narrow defiles or gaps, as the Hudson in its traverse of the Highlands. See APPALACHIANS, BLACK MOUNTAINS. Consult Whitney, *United States* (Boston, 1889), Morley, *Carolina Mountains* (Boston, 1913).

BLUE RIVER, or **BIG BLUE RIVER** A river rising in Washington Co., Ind., flowing southwest and emptying into the Ohio River a few miles above Leavenworth (Map Indiana, C 4). It has a course of less than 100 miles, but it affords some water power. This name is also applied to the east fork of the White River (q.v.).

BLUE SEA See ARAL LAKE

BLUE SICKNESS See HOG CHOLERA

BLUE-STEM GRASSES See ANDROPOGON

BLUE-STOCKING CLUB A social gathering, probably an Anglicization of the *l'Hotel de Rambouillet* movement of seventeenth-century France, which extended to England in the eighteenth century. The meetings, held at the houses of Mrs. Montague, Mrs. Vesey, and other literary women, were characterized by plainness of dress. One of the members, Mr. Benjamin Stillingfleet, is said to have habitually worn blue hose, and the wits were not long in dubbing the coterie "The Bluestocking Club." An interesting account of these meetings may be found in the *Memoirs* of Elizabeth Carter (London, 1816). The name "bluestocking" has been since applied to a literary woman. Consult also, Lobban, "The Blue-Stockings," *Blackwood's Magazine*, vol. CLXXX (London, 1906).

BLUESTONE A term originally applied to a sandstone quarried in Ulster Co., N. Y., but now applied to much of the flagstone quarried in this and even other States regardless of color. See BUILDING STONE.

BLUESTONE, or **BLUE VITRIOL** The commercial name for copper sulphate. See under COPPER.

BLUE THISTLE, this? See VIREN'S BUGLOSS.

BLUETHROAT A remarkable little European bird, allied to the robin (and hence sometimes called "bluebreast" in England, where it is an infrequent visitor), assigned formerly to the genus *Cyanocitta*, but now included with the nightingale in the group *Luscinia*. It is characterized by a bright-blue throat, separated from the white below it by crescentic bands of black and rust-red. Two species are known, one hav-

ing a white spot in the centre of the blue (*Cyanocitta leucocyanica*, or *Luscinia cyanecula*), and ranging from Barbary to Holland and Germany; and the other (*Cyanocitta*, or *Luscinia, suecica*) with a brick-red fan-shaped patch in the midst of the blue. (See PLATE of SONG BIRDS accompanying THURM.) This latter species is highly migratory, spending its winters in tropical Africa and India and going each summer to breeding haunts in Scandinavia, northern Russia, Siberia, and western Alaska. One feature of this migration renders it extraordinary, viz., that the bird has almost never been seen in the countries intermediate between its summer and winter homes, so that apparently it makes the whole journey of not less than 1500 miles in a single flight, either at night or at an invisible altitude. (See MIGRATION of ANIMALS.) The Alaskan visitors also cross Bering Strait twice annually, never migrating southward.

The bluethroat is known throughout northern Europe as the Swedish nightingale on account of its fine singing; and the Laplanders style it "the bird of the hundred voices," because of its remarkable powers of mimicry. Seebohm and Brown (*Ibis*, vol. vi, p. 125, 1876) were greatly impressed by this power in Siberia, where it is exceedingly abundant in thickets and along stream courses as far north as 71°, making its nest in bushes and weeds. They mention its imitating the trilling of the sandpiper, the rich song of the redwing, and various other birds. "Sometimes he runs these together in such a way as to form a perfect medley of bird music." Consult the books on the ornithology of Europe, Siberia, and Alaska, mentioned under BIRD.

BLUE VITRIOL. See COPPER.

BLUE WHALE. See SIBBALD'S WHALE.

BLUEWING. A duck. See TEAL.

BLUFFTON. A city and the county seat of Wells Co., Ind., 25 miles south of Fort Wayne, on the Wabash River, and on the Lake Erie and Western, the Toledo, St. Louis, and Kansas City, and other railroads (Map: Indiana, D 2). It has a considerable grain and lumber trade, foundry and machine shops, a wind-pump factory, a piano factory, cement and tile works, and manufactures barrels, hoops, staves, and headings, buck handles, clay pottery, mittens, etc. Settled in 1837, Bluffton was incorporated in 1849. The government is administered by a mayor, elected every four years, and a municipal council. The city owns and operates its water works and electric light plant. Pop., 1890, 3589; 1900, 4479; 1910, 4957.

BLUHME, blow'me, CHRISTIAN ALBRECHT (1794-1866). A Danish statesman, born in Copenhagen. He studied jurisprudence from 1811 to 1816, was appointed director of the general customhouse in 1843, and in 1848 Minister of Commerce. In 1851 he became Minister of Foreign Affairs. He took measures for the maintenance of Danish neutrality during the Crimean War and, having resigned in 1854, was brought to trial with the remainder of the ministry on the ground that the expenditures for national defense had been made without appeal to the Rigsdag. He was acquitted in 1856, and again in 1864-65 took charge of the portfolio of Foreign Affairs, and at the same time acted as President of the Council of the Ministry.

BLUHME, FRIEDRICH (1797-1874). A German jurist. He was born in Hamburg, and educated in Göttingen, Berlin, and Jena. In 1833 he was appointed judge of the High Court of

Appeal at Lübeck, and was professor successively at Halle (1823), Göttingen (1831), and Bonn (1843). His works include many valuable studies in Roman and German law, among them *Grundriss des Pandektenrechts* (2d ed., 1844); *Encyklopädie der in Deutschland geltenden Rechte* (3 vols., 1847-58); *Zur Texteskritik des Westgotenrechts* (1872). The treatise "Die Ordnung der Fragmente in den Pandektenbüchern" (*Zeitschrift für geschichtliche Rechtswissenschaft*, vol. iv, 1820) explained the method of arranging the excerpts in Justinian's Pandects.

BLÜNG. A blue compound, used especially in the laundry to neutralize the yellow tinge of white clothes, but also for sugar and various other food products. Formerly blue pigments, such as indigo, ultramarines, and Prussian blue, were used, which, being insoluble, gave color by suspension in water. More recently soluble Prussian and coal-tar blues have taken their place, although ultramarine blues are still largely employed. The great objection to Prussian blue is its dissociation, in the presence of an alkali, with the formation of ferric hydroxide, which appears as iron rust on the clothes.

BLUM, Fr. pron. blēm, ERNEST (1836-1907). A French dramatist, born in Paris. He made his début as a writer at the age of 16 with *Une femme qui mord*. As a journalist he was associated with *Charivari*, *Rappel*, *Gaulois*, and other publications. Many of his dramatic works were written in collaboration with Clairville, Flan, Monnier, Brisbarre, Labiche, and others. Among the vaudevilles, librettos, and dramas of this versatile writer, the following are especially noteworthy: *Les noces de diable* (1862); *Rocambold* (1864); *La vengeance* (1868); *La folie parfumeuse* (1874); *Rose Michel* (1875); *Espion du roi* (1876); *Le petit chaperon rouge* (1885); *Les femmes nerveuses* (1888); *La rieuse* (1894); *Le carillon* (1897); *Un soir d'hiver* (1903); *Le jeu de l'amour et de la roulette* (1905).

BLUM, bloom, HANS (1841-1910). A German publicist and author, son of Robert Blum, born in Leipzig and educated at the universities of Leipzig and Bern. He was a member of the North German Reichstag from 1867 to 1870 and from 1869 to 1900 a barrister in Leipzig. During the Franco-Prussian War he was in the field as correspondent for *Daheim* and in 1871-79 edited the *Grenzboten*. His extensive and varied publications include: *Die Lügen unserer Sozialdemokratie* (1891); *Fürst Bismarck und seine Zeit* (6 vols., 1894-95); *Das erste Vierteljahrhundert des deutschen Reichs* (1896); *Persönliche Erinnerungen an den Fürsten Bismarck* (1900); *Aus dem toten Jahr* (1901), dealing with the revolutionary movement of 1848; some dramas, short stories, and novels, of which *Bernhard von Weimar* deserves a better reception than it got. Consult his *Lebenserinnerungen* (2 vols., Berlin, 1907-08).

BLUM, ROBERT (1807-48). A German patriot. He was born in very humble circumstances in Cologne, Nov. 10, 1807, and after a brief military service in 1830 became sceneshifter and afterward secretary of a theatre in Cologne and subsequently in Leipzig. In this situation he remained, devoting his leisure time to literature and politics until 1847, when he established himself as a bookseller and publisher. In 1840 he founded in Leipzig the *Schillerverein*, which celebrated the poet's anniversary, as a festival in honor of political liberty. In 1845 he acquired great reputation as a popular orator in

connection with the German Catholic movement, and particularly through his action at a turbulent meeting of armed citizens and students of Leipzig, whom he dissuaded from storming the barracks. He became the champion of the Liberal party of Saxony on the outbreak of the Revolution of February, 1848, and was elected vice president of the Preliminary Parliament at Frankfurt. In the National Assembly he became leader of the Left, and was one of the bearers of a congratulatory address from the Left to the people of Vienna when they rose in October. In Vienna he joined the Students' Corps, was arrested, and shot on November 9. Blum was a man of strong intelligence and great oratorical power. Consult Hans Blum, *Robert Blum* (Leipzig, 1878).

BLUM, blum, ROBERT FREDERICK (1857-1903). A prominent American figure painter. He was born in Cincinnati, Ohio, July 9, 1857. His artistic education began with his apprenticeship to a lithographer in his native city and attendance upon night classes of the McMicken School of Design. In 1876 he was for nine months a pupil in the Pennsylvania Academy of Fine Arts in Philadelphia, but he was to all intents and purposes self-taught. He removed to New York in 1879 and was employed as an illustrator of *Scribner's Magazine*. In 1880 he made the first of many annual European tours, continued until 1889. He was the first president of the Society of Painters in Pastel, in New York, and first exhibited work in this medium in 1882. The best known of his oil paintings of the early period is his "Venetian Lace-makers" (1885), now in the Cincinnati Museum. In 1890, through a commission to illustrate Sir Edwin Arnold's *Japonica*, he realized his great ambition of going to Japan, remaining until 1893. His delightful pastels of the open-air life and scenery of that country are his best productions in this medium. He was elected to the National Academy of Design in 1892, after exhibiting "The Ameyu," now in the Metropolitan Museum of Art. His celebrated *Letters from Japan* appeared in *Scribner's* (1893), and his best-known work, the *Friezes* in old Mendelssohn Hall, were finished in 1898. The building has since been torn down, but the paintings, which were epoch-making in their way, fortunately were preserved. At the time of his premature death he was engaged upon a decoration for the New Amsterdam Theatre.

At the outset of his career Blum was often criticised on account of the successive influence of Fortuny, Whistler, and Rico upon his work. He was, however, adaptable rather than subservient, and all of his work reveals his distinct and interesting personality—brilliant and witty, but also poetic and full of sentiment. The dominant technical note of his art is its bright and delicate color, with a predilection for sunshine effects. His artistic personality is most completely revealed in his pastels, in which medium he ranks among the very best. Most of his paintings are in private possession. An important collection of his pastels of Dutch subjects belongs to Robert Sterling Clark, of New York, another of Japanese subjects to Stephen C. Clark, who also possesses a number of his oils and water colors. An excellent memorial exhibition of his works was held in New York in 1913. Consult *The Studio*, winter number (1900-01), the *International Studio*, vol. xxi, supp. (1903).

BLUMAUER, blou'mou-er, ALOYS (1755-98). A German poet, born in Steyer. His works, which are chiefly satires on the clergy and on the Jesuit Order (of which he himself had become a member a year before its dissolution in 1773), enjoyed a wide popularity. He is remembered, however, chiefly for his *Abenteuer des frommen Helden Aeneas* (1784-88, published with introduction and commentary by E. Griesebach, 1872), a coarse travesty on Vergil's *Aeneid*, after the fashion of Scarron's *Feigle travesti*. It is still widely read in Germany. His complete works, *Sammtliche Werke*, appeared after his death (4 vols., 1801-03, republished, 4 vols., 1884). Consult Hofmann-Welnhof, *Aloys Blumauer* (Vienna, 1885).

BLUMENBACH, blou'men-bag, JOHANN FRIEDRICH (1752-1840). A German naturalist, physiologist, and anthropologist, born in Gotha. He studied in Jena and in Göttingen, where he graduated with the degree of M.D. in 1776. He began to teach in Göttingen in 1776, became a professor in 1778, and exercised the greatest influence as a teacher for more than 50 years. He founded the science of anthropology. His *Collectio Cramorum Diversarum Gentium* (1790-1828) gave the results of observations upon the skulls of different races. He advocated the theory of the unity of the human race and divided it into five types—Caucasian, Mongolian, Malay, American, and Ethiopian. His *Handbuch der Naturgeschichte* (1780) has gone through many editions. He was the first to place comparative anatomy on a thoroughly scientific basis, and in 1805 published his *Handbuch der vergleichenden Anatomie*. He speculated on the power of generation and regeneration and imagined that a *msus formativus*, or formative tendency, was possessed by all living things. Consult his *Ueber den Bildungstrieb und das Zeugungsgeschäft* (Göttingen, 1791).

BLUMENTHAL, blou'men-tal, LEONHARD, COUNT VON (1810-1900). A Prussian field marshal. He was born July 30, 1810, at Schwedt-on-the-Oder. He received a military education in the Prussian Cadet Corps and in 1827 became an officer in the Reserve Guard. From 1830 to 1833 he studied at the Berlin Military Academy. In 1848 he became a member of the Prussian General Staff. He was chief of staff of the Schleswig-Holstein army in 1849, became aid-de-camp to Prince Frederick Charles (1858), colonel of the Seventy-first Infantry (1860), and chief of staff of the Austro-Prussian army in the war against Denmark (1864). In the same year he was made a major general and in the campaign of 1866 against Austria acted as chief of staff to the Crown Prince Frederick William and distinguished himself at Königgrätz. After the war Blumenthal became a lieutenant general. During the Franco-Prussian War he again acted as chief of staff to the Crown Prince. He was afterward intrusted with the command of the Fourth Army Corps, with headquarters at Magdeburg, and given the rank of general of infantry in 1873. In 1888 he was created field marshal and given important duties as inspector general of the Fourth Division. He died Dec. 22, 1900.

BLUMENTHAL, Oskar (1852-) A German dramatist and satirist, born in Berlin. He founded there the Lessing Theatre (1888), which he managed from 1888 to 1897 and devoted chiefly to the production of contemporary comedies. He edited a critical edition of Grabbe's works (4 vols., 1874). Among his

own works first produced at the Lessing Theatre, the most popular are the comedies, *Der Probefehl* (1882); *Die grosse Glocke*; *Der schwarze Schleier* (1891); *Heute und Gestern*, with G. Kadelburg (1892); *Im weissen Rossel*, with Kadelburg (1898; Eng. trans., 1907, under the title *At the White Horse Tavern*); *Matthias Gollinger*, with M. Bernstein (1898); *Die strengen Herren*, with Kadelburg (1900); *Federkrieg* (1901), *Das Theaterdorf* and *Der blinde Passagier*, with Kadelburg (1902); *Wann wir altern* (1903); the serious dramas *Der tote Lowe* (1904), dealing under a thin disguise with Bismarck's dismissal by William II; *Der Schieur der Treue* (1905); *Die Tur ins Freie* (1908); *Der Schlechte Ruf* (1909); *Die Kunst zu lacheln* (1910); *Wellenringe* (1912). He also published epigrams (*Klingende Pfeile*, 1904) and sketches. Blumenthal at first wrote plays with some regard for the canons of art, but soon dropped lower and lower in the scale till he reached the rapid manufacture of empty farces.

BLUMER, GEORGE ALDER (1857-). An Anglo-American physician, born in Sunderland, England. He studied at the University of Edinburgh, graduated in 1879 at the medical department of the University of Pennsylvania, and in 1879-80 was resident physician at the German Hospital, Philadelphia, Pa. From 1880 to 1886 he was assistant physician at the Utica State Hospital, of which he was superintendent in 1886-89. In 1889 he was appointed superintendent of the Butler Hospital for the Insane, Providence, R. I. He also became an associate editor of the *American Journal of Insanity*. He became president of the American Medico-Psychological Association in 1903.

BLUMER, blum'ər, JOHANN JAKOB (1810-75). A Swiss jurist and statesman, born in Glarus, Switzerland. He studied at the universities of Zürich, Bonn, and Berlin. In 1843 he was elected to the Swiss Landrat and in 1861 became president of the Court of Appeals. Between 1861 and 1874 he completed his revision of the civil and criminal law of Switzerland, a work of lasting value, and subsequently he was chosen president of the Permanent Court of the Swiss Federation. His books include *Staats und Rechtsgeschichten der schweizerischen Demokratien* (3 vols., 1850-59) and *Handbuch des schweizerischen Bundesstaatsrechts* (2 vols., 1877-87). Consult his life and works (2d ed., Glarus, 1877).

BLÜMNER, blum'nər, HUGO (1844-). A German classical scholar, born in Bernh., Aug. 9, 1844. He taught in the universities of Breslau and Königsberg and has been since 1877 professor in the University of Zürich. He is author and editor of many philological and archaeological works, of which the most important are: *Die gewerbliche Thätigkeit der Völker des klassischen Altertums* (1869); *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern* (4 vols., 1874-88); *Leben und Sitten der Griechen* (1887); *Maximaltarif des Dioletianus*, with Theodor Mommsen (1893); *Pausanias Graecia Descriptio*, a text, with commentary, written in conjunction with Hitzig (Leipzig, 1896 et seq.); *Die Römischen Privataltertümer*, part of vol. iv of Müller's *Handbuch* (Munich, 1911). He revised also Hermann, *Griechische Privataltertümer* (1881), etc. In 1912 he published the first volume of a thoroughgoing revision of his *Technologie und Terminologie*, etc.

BLUNDELL'S SCHOOL. One of the best of the smaller English public schools, especially noted in the west of England. It was founded in 1604 under the will of Peter Blundell, in Tiverton, Devonshire. Beginning life as a poor boy, he amassed a considerable fortune, most of which was left to charities, the greatest of which was this school. There were founded in connection with it scholarships at Balliol College, Oxford, and at Sidney Sussex College, Cambridge. Although its pupils have never been very numerous—the present number is 230—this school has sent forth many distinguished men, including Bishops Bull, Hayter, and Conybeare, Abraham Hayward, the essayist, and R. D. Blackmore, the novelist. John Ridd, the hero of *Lorna Doone*, was also a member of the school.

BLUNDERBUSS (either corruption of Dutch *donderbus*, thunder box, i.e., musket, or from *blunder* + Dutch *bns*, Ger. *Buchse*, box, barrel of a gun). An old-fashioned short musket with a wide, smooth bore sufficient to take in several shots or bullets at one charge. A number of the English and German troopers in the seventeenth century were armed with this weapon, which had a limited range and was more particularly effective at close quarters or in the defense of narrow passages. It has long been obsolete. See SMALL ARMS.

BLUNT, JAMES G. (1826-81). An American soldier. He was born in Trenton, Me., and in 1849 graduated at the Starling Medical College, Columbus, Ohio. In 1856 he settled in Kansas, where he strenuously opposed the introduction of slavery and was a member of the convention that framed the State Constitution. He entered the Federal army as lieutenant colonel at the outbreak of the Civil War, and in 1862 was made brigadier general and placed in command of the Department of Kansas. On December 7, at Prairie Grove, he defeated a force under General Hindman and thus checked the advance of the Confederates into Missouri. He was raised to the rank of major general in November, 1862, but in 1863 was relieved of the command of the department, and assigned to the Army of the Frontier.

BLUNT, JOHN HENRY (1823-84). An English High-Church theologian and writer on ecclesiastical history. He was born in Chelsea, studied at University College, Durham, and was ordained a priest of the Established church in 1846. He was appointed a vicar of Kennington in 1848 and in 1873 rector of Beverton. He contributed much to reviews and periodicals, and his publications include *The Atonement* (1855); *A Cyclopedia of Religion* (1884); and an important *History of the Reformation of the Church of England* (1862-82), written from the High-Church standpoint.

BLUNT, JOHN JAMES (1794-1855). An English clergyman and author, born in Newcastle-under-Lyme, Staffordshire. He graduated in 1816 at St. John's College, Cambridge, was curate at Hodnet, Shropshire, to Reginald Fleber, whom he succeeded; and subsequently was curate also at Chetwynd. In 1834 he became rector of Great Oakley, Essex, and in 1839 professor of divinity at Cambridge. He wrote a considerable number of works on ecclesiastical history and biblical criticism, besides several volumes of sermons. The best known of his publications is *Undesigned Coincidences in the Writings both of the Old and New Testament, an Argument of their Veracity* (1847). Con-

sult Selwyn, "Memoir," in Blunt's *Two Introductory Lectures* (1856)

BLUNT, WILFRED SCAWEN (1840-). An English traveler and poet. He was born near Crawley, England, Aug. 17, 1840. His mother being a Catholic convert, he was educated at Stonyhurst and at St. Mary's, Oscott. He served for some years as attaché to various British embassies in Europe, and in 1869 married Anne, daughter of the Earl of Lovelace, and granddaughter of Lord Byron, with whom he traveled through Spain, Algeria, Egypt, and the Syrian Desert. In 1882 he championed the cause of Arabi Pasha (qv) and later took up the Nationalist cause in Ireland. In 1887-88 he was imprisoned for two months for taking part in a prohibited meeting at Woodford, in county Galway. Blunt won attention by the *Love Sonnets of Proteus* (1880), containing a fine sonnet on Gibraltar. This volume has been followed by *Esther* (1892), *Griseida* (1893), the *Quatrains of Youth* (1898), *Satan Absolved. A Mystery* (1899), and *Seven Golden Odes of Pagan Arabia* (1903). His poems are human and realistic. He is also the author of *Secret History of the English Occupation of Egypt* (1907), *India under Ryon* (1909), *Gordon at Khartoum* (1911), and *The Land War in Ireland* (1912).

BLUNT'HEAD. A curious colubrine innocuous snake (*Amblycephalus* *boa*) of Java and the East Indies, the type of the family *Amblycephalidae*, and allied to the night tree snakes (*Dipsadidae*). It is slender, about 3 feet long, and purplish in color, densely mottled and marked with brown, with rosy spots and cheeks, and lips carmine-red. Its large head is shaped like that of a mastiff, "which animal it further resembles by snapping at whatever disturbs it." Having a prehensile tail, it climbs with great ease and at night creeps about the thatch of houses in Java and Borneo, in search of insects, the natives welcoming it as a vermin destroyer.

BLUNTSCHLI, blunt'shlé, JOHANN KASPAR (1808-81). A famous German jurist, born in Zurich, Switzerland. He studied jurisprudence first at the University of Zurich, then under Savigny in Berlin, and finally at Bonn, where he took his degree in 1829. Returning to his native country, he became professor of law in the University of Zurich in 1833, and shortly thereafter a member of the grand council of the local government. He distinguished himself by his vigorous opposition to the civil war of 1847-48. In 1848 he became professor of German and international law at Munich, and in 1861 professor of political science and jurisprudence at Heidelberg. In 1864, with Baumgarten and others, he founded the Protestant Union and subsequently presided over several Protestant conventions and over the General Synod at Baden in 1867. He also presided, in 1861, over the International Congress of Jurists in Dresden. Bluntschli was one of the founders and (1875-77) president of the Institute of International Law at Ghent and was generally considered one of the highest European authorities on international law. He was always active in politics and in 1867 was elected to the *Zollparlament* (customs parliament). His valuable library, mainly historical, is now owned by the Johns Hopkins University of Baltimore. His legal writings include *Geschichte des allgemeinen Rechts* (1864), *Des moderne Kriegerrecht* (1866), and *Das moderne Völkerrecht* (1868). He was also the author of a highly esteemed

work on political science, *Die Lehre vom Staat* (1875), and of several books on Swiss history.

BLUSHING (AS *blýscan*, to glow, *blýsa*, a torch). A sudden reddening of the face, neck, and breast, owing to some mental shock, most commonly of the character of shyness, shame, or modesty. It is produced by an increased flow of blood into the capillary vessels over the parts where the blush extends, resulting from a temporary vasomotor paralysis. Besides reddening the complexion, it creates a sensible augmentation of heat in those parts. The feeling that accompanies a blush is one of distress—of heat and general discomfort. Children rarely blush. Darwin is authority for the statement that people of races that habitually are nearly naked blush down to the waist. There is a nerve filament, from the sympathetic system, lying within the sheath of and parallel with each artery and capillary, controlling the expansion and contraction of the muscular coat of the vessel. This is called a vasomotor nerve. During the mental stress that accompanies blushing the action of the vasomotor nerve is suspended and the arteries and capillaries dilate, producing the phenomenon, the heart's action being unaffected. Mental stress of a nature to moderate or control the heart's action is more likely to cause pallor of the surface, owing to the decreased amount of blood passing through the arteries, and the correspondingly greater contraction of their coats. Consult Darwin, *Expression of Emotions in Man and Animals* (London, 1872), Mitchell, *About Dreaming and Blushing* (Edinburgh, 1905).

BLUTHGEN, blut'gen, VICTOR (1844-). A German author. He was born in Zorbig, near Halle, studied theology at the university of the latter city, assisted in the preparation of a theological dictionary and was for a short time a journalist. His best-known works are his *Gedichte* (1881, new ed, 1901), a number of books for the young, including his text to Flinzer's *Schelmenspiegel* (1876), *Froschmaus-Krieg* (1878), *Hesperiden* (1879), a volume of tales, which was translated into Danish, the novelettes in the collection called *Bunte Novellen* (2 vols, 1880), *Der Friedensstörer* (1883), *Pavet-house* (1884), *Die Stiefschwester* (1887), and the novels *Aus garenden Zeit* (2 vols, 1884), *Frau Grafen* (2 vols, 1892), *Die Spiritisten* (1903). He also wrote *Das Peterle von Nurnberg* (1907) and *Mama kommt* (1911).

BLYDEN, EDWARD WILMOT (1832-1912). A negro scholar and author, born at St. Thomas, West Indies. He came to the United States in 1845, seeking entrance in some American college, but a hostile reception caused him to change his plans, he went to Liberia and there graduated from the Alexander High School. Later he became principal of this school, then professor and president (1880) of Liberia College. Having been ordained a Presbyterian minister, he was commissioner to the general assembly of the American Presbyterian church in 1861 and in 1880. In Liberia he held the offices of Secretary of State and of the Interior, and in 1892 he was appointed Minister to the court of St. James's. Dr. Blyden was an accomplished linguist. Spanish he learned at the age of 10 during a short stay in Venezuela, and Arabic during a visit to the Orient. In addition he was master of Latin, Greek, Hebrew, Italian, and French. His publications include *Liberia's Past, Present, and Future* (1869); *Liberia's*

Offering (1873); *From West Africa to Palestine* (1873); *Christianity, Islam, and the Negro Race* (1887; 2d ed., 1888); *West Africa before Europe* (1905); *The Three Needs of Liberia* (1908); *African Life and Customs* (1908); *The Problems before Liberia* (1909).

BLYTHEVILLE. A city and the county seat of Mississippi Co., Ark., 65 miles north of Memphis, Tenn., on the Frisco Lines, the Jonesboro, Lake City, and Eastern, the Paragould, Southeastern, and the Blytheville, Leachville, and Arkansas Southern railroads (Map: Arkansas, F 2). It is in a fertile cotton and corn region and has a large cotton compress and hardwood and lumber interests. Pop., 1900, 302; 1910, 3849.

B'NAI B'RITH, b'nî b'rêth, INDEPENDENT ORDER OF. An organization of Israelites of German extraction, founded in America in 1843 and since extended through Germany and in the East. It somewhat resembles the Masonic organization without its secrecy and ceremonial. Its object is the moral elevation of its members, who numbered in 1913 over 35,000 in over 600 lodges.

BOA, bô'â (Lat. *boa*, *bova*, a large serpent; perhaps akin to *bos*, ox, owing to its size). Any of the large nonvenomous snakes of tropical America of the family Boidæ. These are closely related to the pythons; and popularly the name is applied to any large snake that entwines its prey, crushes it, and swallows it whole—a "boa constrictor." These great serpents feed upon living animals of all sorts, for which they lie in wait, often hanging for hours together from trees. The weight of the body is borne under such conditions partly by the prehensile tail, aided perhaps by two opposing hooks on each side of the vent. These hooks are held by muscles attached to several bones, all below the skin, which are the rudiments of the hind limbs of the higher vertebrates. The boa seizes its prey with a swift dart of the head and forward part of the body, and the numerous long backward-leaning teeth hold the struggling animal until the snake throws one or more folds about it and compresses it to death. It may also seize an animal by knotting a fold of its tail or some part of its body around it; and thus boas have been seen to capture, crush, and hold two or three victims at once. The swallowing is a slow and laborious process, aided by a copious flow of saliva, which serves both to lubricate and to digest the mass of food. Boas are able to swallow creatures considerably larger than their own heads, because the loose and elastic articulation of the jaws (see SNAKE) enables the mouth to be opened both vertically and horizontally. While the process of digestion is going on, for which weeks may be necessary, the boa remains in a state of torpidity and then is easily killed. The boas are afflicted with many and at times fatal intestinal worms, received from the bodies of their victims. Excepting such adversaries, the larger of these powerful serpents have almost nothing to fear.

The name *Boa constrictor* properly belongs to one of the smaller of the boas, 12 feet long, which is most abundant in Guiana and Brazil. It is an exceedingly handsome serpent, brownish, changing to brick-red on the tail, while along the back is a row of tan-colored saddle-shaped spots, becoming pale cream on the tail in sharp contrast to the red of that region. (See accompanying Plate.) The emperor (*Boa*

imperator) of Central America and Mexico resembles it, but has the markings separated by light lines along the sides. A third allied species is the lamanda, to which a sort of worship was paid by the ancient Central Americans, named *Boa divinitiqua*, of which the Mexican boa (var. *meviana*) is a northerly form. A fourth, and probably the best-known, species, is the rainbow, or ringed boa (*Epiorates cenchris*), which is found all over Brazil, but nowhere numerously, and northward to Costa Rica; it is about 5 feet long and is marked with circular or 8-shaped spots, having a dark border. In the sunlight it glows with a wonderful iridescence. This is one of the species called *aboma* and *jiboya*—Brazilian terms, which, like "boiguacu" and some others that have found currency in books, are very indefinite. The genus *Epiorates* embraces the "tree boas," most of which are slender snakes of moderate length, having distinct necks and somewhat triangular heads, which obtain their food in trees and bushes, or by hanging from branches and striking passing prey; they have the singular faculty of clinging firmly to the upper surface of a leafy branch without curling any part of the body around it, and no amount of wind waving or other agitation will loosen the hold of their looped length short of complete overturning. The swiftness of their stroke is too great to follow with the eyes. Another genus is often represented in menageries by the dog-headed boa (*Xiphosoma caninum*) of the Amazon region. It often exceeds 5 feet in length and is green above and bright yellow beneath, ornamented with clustered white spots edged with purplish black. The sand snakes (*Eryx*), the Californian *Ilichanuras*, and various other generic forms also belong to the Boa family.

The greatest of all the boas is the water boa (*Eunectes murinus*), best known as the anaconda. Although the home of this huge serpent is wholly within the valleys of the Amazon and Orinoco, the name was borrowed from the Portuguese name of a Ceylonese python, and fixed by Cuvier in 1817; its most widespread Brazilian name is "sucuriuba," or simply "sucuria." It is far more aquatic in its habits than any other big American snake, spending a large part of the time in the water, to which its structure is adapted, the nostrils being very small, placed vertically in the top of the heavily scaled nose, and closable by valves. Thus it can swim safely under water and need only push the merest point of its head above the surface in order to take breath. Its eyes, also, are elevated, prominent, and so placed that it can see both ahead and downward (into the water), which most snakes cannot do. Although, like the others, it hangs from trees or lies coiled on the bank waiting to seize anything manageable that may come in its way, it also sinks its body in the water and waits at chosen places near the bank until some animal comes down to drink, when it seizes it by the nose with a grip from which beasts rarely escape before they are dragged down, enfolded, and drowned in its crushing embrace. One of the Brazilian names is "deer swallower," and stories are told of its killing and eating cattle, horses, and jaguars; but these must be regarded as fanciful tales, inspired by the same imagination which says it reaches a length of from 50 to 80 feet. The largest specimen actually measured is that (a

stuffed skin) in the British Museum, which is 29 feet long, it is not probable that this is often much exceeded, while the average maximum length is, no doubt, nearer 20 than 30 feet. A snake of the largest size could certainly kill, and might swallow, one of the small Brazilian deer, at any rate a hornless doe or fawn, but the more ordinary food consists of rodents, from the capybara down, peccaries, birds and their eggs, and fishes and reptiles, including their own kind. This serpent is rich green in color and marked with round blackish blotches, which often run together, as shown in the accompanying illustration.

The boas are viviparous, and in captivity the anaconda has been known to give birth to 34, while a brood of young boa constrictors has numbered 64. All the boas are hardy and long-lived, and those mentioned above are to be seen in various zoological gardens, where they usually thrive well if protected from cold and intelligently treated, and often come to know their keepers and be very friendly with them. Certain species are constantly tamed and kept as pets among the villagers of Brazil and Central America, and occasionally completely tamed specimens have been known in other parts of the world, not only among performers in animal shows, but in private, of which the most famous recent example is the boa "Cleo," kept by Mr and Mrs Mann in London, and described by Frank Buckland in *Land and Water* and elsewhere about 1877. For special information, consult Moles and Ulrich, "Serpents of Trinidad," in *Proc Zool Soc of London*, 1894, pp 499 et seq.; Hopley, *Snakes* (London, 1882); Gosse, *A Naturalist's Sojourn in Jamaica* (London, 1851); Ditmars, *Reptiles of the World* (New York, 1910).

BOABDIL, bō'ab-dēl' (corrupted from Abu-Abdallah). The last Moorish King of Granada, surnamed *El Chico*, 'The Little', and *El Zogorby*, 'The Unlucky'. He expelled his father, Abu'l Nassan, in 1432, but the next year was defeated by the army of Castile near Lucena, and taken prisoner, but on agreeing to pay tribute was set free and returned to Granada to struggle for the throne against his father and his uncle, Abdallah-el Zaghali. The power of the Moors was greatly shaken by this civil conflict, and the dispute was finally settled by Ferdinand of Aragon, who in 1492 captured Granada, in spite of the reckless courage of the Moors and of Boabdil. The story goes that Boabdil, having handed over to Ferdinand the keys of the city, was riding on towards the mountains, when he turned, at Padul, on a spur of the Alpuzarras, to take a last look at the towers of Granada. "Allhu Akbar!" ('God is great'), he exclaimed, bursting into tears. His mother, standing beside him, exclaimed, "You may well weep like a woman for what you could not defend like a man." The spot still bears the name of *El Último Suspiro del Moro*, 'The Last Sigh of the Moor'. Boabdil soon crossed to Africa and lost his life in battle. Consult Lane-Poole, *The Moors in Spain* (New York, 1886); Dozy, *Spanish Islam* (London, 1913). See GRANADA.

BOAC, bō-ak'. The capital of the island of Marinduque, Philippines, situated about 48 miles from Calapan (Map Philippine Islands, C 4). It is about 160 miles by water from Manila and carries on a brisk coast trade. Pop., 1903, 15,823.

BO'ADICE'A, or, more correctly, **BOUDICCA**

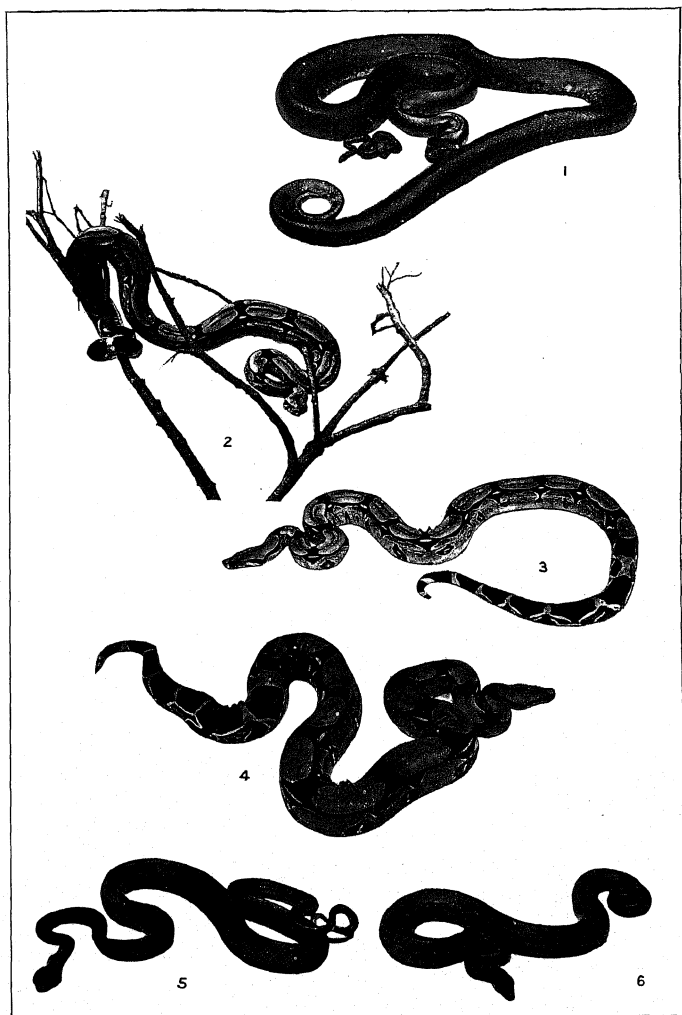
(?-62 AD) Queen of the Iceni, a tribe inhabiting the territory now included in Norfolk and a part of Suffolk. Prasutagus, her husband, who died about 60 AD, left his wealth jointly to his two daughters and to the Roman Emperor Nero, hoping that by this artifice his kingdom would be protected from oppression, but the Roman soldiery, taking advantage of the defenseless condition of the country, began to plunder unscrupulously. Boadicea herself was scourged, her daughters were violated, and the nobles among the Iceni were plundered and ill-treated. These outrages drove them into a revolt, in which they were joined by the Tinobantes. Boadicea gathered round her a large army, attacked and captured the Roman colony of Camulodunum (Colchester), took Londinium and Verulamium, and destroyed, according to Tacitus, 70,000 Romans and British partisans of Rome. Suetonius Paulinus, the Roman Governor of Britain, with about 10,000 legionaries, took up his position in a narrow valley, where he could not be surrounded from the rear or outflanked. Boadicea, who, it is said, had under her command over 200,000 men, attempted to destroy his army. A dreadful battle ensued (62), in which 80,000 Britons were said to have perished, and only 400 Romans. These figures, of course, cannot be trusted, but the victory must have been decisive, as it established the authority of the Romans in Britain. Boadicea, overwhelmed with despair, committed suicide. Consult Tacitus, *Agriicola*, xvi, and *Annales*, xiv, 31-35, with the notes in the edition of the *Annals* by F. E. B. (Oxford, 1891); Elton, *Origins of English History* (London, 1882); Rhye, *Celtic Britain* (London, 1882); Haverfield, *The Romanization of Roman Britain* (Oxford, 1912).

BOANERGES (Gk *Boanerpēs*, *Boanērgēs*, of uncertain etymology). The surname given by Jesus to James and John, which Mark (iii. 17) interprets as meaning 'sons of thunder,' doubtless under the influence of the narrative of Luke ix 54. It describes possibly the fiery zeal of these two disciples displayed in such incidents as Luke ix 51-56 and Mark ix. 37-39. Like "Peter" it was not necessarily given at the time of the choosing of the Twelve, where Mark records it, but, unlike "Peter," it apparently did not persist in use.

It has been explained as an application of the folklore name connected with the cult of the *Dioscuri*, the Twin Brothers, given to these Sons of Zebedee because they were twins or of twin likeness in character and action (J Rendel Harris, *Boanerges*, 1913), and has been accounted for, along with Dalmanutha (Mark viii. 10), as the result of an imperfect attempt to copy an illegible text (Burkitt, *Earliest Sources for the Life of Jesus*, pp 32 f.).

BOAR (AS *bār*, OHG *bēr*, Ger. *Bai*, in hood boai, cf. Russ *borovā*, boai), WILD. The common and most typical species (*Sus scrofa*) of wild swine, which exceeds the largest domestic swine in size and is far superior to them in strength and swiftness. It is grayish black in color, covered with short, woolly hair, thickly interspersed with stiff, coarse bristles, which assume the form of a mane along the spine. The ears are always black. Its great tusks are formidable weapons, but when old the tusks curve over the snout and are no longer serviceable for goring, then, however, the teeth of the upper jaw protrude and curve outward, serving

BOAS



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1. ANACONDA (*Eunectes murinus*).
2. IMPERIAL BOA (*Boa imperator*).
3. MEXICAN BOA (*Boa mexicana*).

4. COMMON BOA (*Boa constrictor*).
5. DOG-HEADED BOA (*Xiphosoma caninum*).
6. ABOMA or RINGED BOA (*Epicrates cenchris*).

the same purpose as the tusks had done. The animal is native in Europe, Asia Minor, and North Africa, inhabiting the deep recesses of marshy forest grounds. Boars were common in England until the time of Henry II, and then not found until, in the reign of Charles I, an unsuccessful attempt was made to raise them in the New Forest. In the time of the Conqueror any one killing a wild boar was liable to have his eyes put out. Consult Harting, *British Animals Extinct within Historic Times* (London, 1880), and Johnston, *British Mammals* (London, 1903).

It was for centuries a favorite beast of chase with the nobles of Europe and was hunted chiefly on foot with the spear, aided by a breed of great dogs now nearly extinct, its strength and ferocity rendering the sport alike exhilarating and dangerous. There is little of boar hunting now, except upon certain great estates in eastern Europe, where the animals are bred for the purpose of sport. In India, however, the wild boars of that country are pursued and speared by mounted men, who regard "pig-sticking" as the most exciting sport the Orient affords. The courage and tenacity of life exhibited by pursued and wounded animals are surprising. The animal seeks its food at night and feeds chiefly on roots and grain, though it will eat smaller animals, birds' eggs, etc. The bristles of the boar are much used for brushes. Besides this one, several other species of boar have been described, of which three at least seem to be valid—*Sus vittatus* of Asia and Africa, *Sus verrucosus* from Java and Celebes, and *Sus barbatus* from Borneo. No species of the genus *Sus* are natives of America or Australia. See PEGGARY; SWINE.

BOARD (AS, *bord*, Ger. *Bord* and *Brett*). In nautical language, a term which has numerous significations. The terms *plank* and *board* were formerly used without much discrimination; hence the application of the word *board* to express in a figurative manner the deck or side of a vessel. From this use are derived the expressions *aboard*, *on board*, *boarding* (i.e., the act of going on board for a friendly or inimical purpose), *inboard* (inside the rail or bulwarks), *outboard*, etc. Before the days of keels and centreboards and for small boats until comparatively recent times, a broad board called a leeboard was secured to the side and projected into the water in a manner to prevent *leeway* (q.v.), when under sail. From this resulted the expressions a *good board*, which meant to lose nothing to leeward on a single stretch while tacking (q.v.), a *half board*, *storn board*, etc. The operation of *boarding* a vessel of the enemy meant a forcible entry for the purpose of capturing it; in the days of sailing vessels, slow steamers, and slow-firing guns it was an operation of importance, but it would not now be attempted except in unusual circumstances.

BOARD (from the *board*, or table, at which the officers sit). The general name applied to persons who in their collective capacity have the management of some public office or department, bank, railway, charity, or, indeed, of any other trust.

BOARDING HOUSE (from *board* or table for food). A house, not an inn or hotel, in which persons are furnished with board and (usually) lodging at an agreed price. Under an agreement for lodging, the boarder is entitled to all the usual and necessary conveniences of

a dwelling house, and the keeper of a boarding house impliedly undertakes that the lodgings are reasonably fit for the purposes of the intended occupation. The legal liability of a boarding-house keeper differs from that of an innkeeper (q.v.) in three important respects. The first difference is due to the fact that he does not hold himself out as engaged in a common public employment. Consequently he is at liberty to reject any person who may apply for accommodations, whether his house is full or not. No person has a right to insist upon boarding with him until a special agreement has been made between them. In the second place, a boarding-house keeper is not subject to the extraordinary liability for the property of the boarder which rests upon an innkeeper for the chattels of his guests. He is bound to exercise only such care as an ordinarily prudent man would take of his own property in similar circumstances. In the third place, the keeper of a boarding house has, at common law, no lien on his boarders' property for bills owing by them, although such a lien has in most of the United States been accorded him by statute. See INN; INNKEEPER; LODGING HOUSE; and the authorities referred to under those titles.

BOARDMAN, GEORGE DANA (1801-31). An American missionary. He was born in Livermore, Me., graduated at Waterville College (now Colby University) in 1822, and studied at Andover Theological Seminary. He was ordained as a Baptist minister in 1825 and in the same year sailed for Calcutta as a missionary. In 1827 he established a mission at Burma and was especially zealous in his work among the Karen villages. His widow married the Rev. Adoniram Judson. Consult A. King, *Memoir of George Dana Boardman* (Boston, 1856).

BOARDMAN, GEORGE DANA (1828-1903). An American Baptist clergyman. He was born at Tavoy, Burma, and was educated at Brown University (1852) and at the Newton Theological Institution. He was pastor of the First Church, Philadelphia, from 1864 to 1894. In June, 1899, he established at the University of Pennsylvania the permanent lectureship known as the "Boardman Foundation in Christian Ethics." He was president of the Christian Arbitration and Peace Society and of the American Baptist Missionary Union. His most important production is a monograph, *Titles of Wednesday Evening Lectures*. It embraces 981 of his lectures, delivered between 1865 and 1880, and comprises a complete exegesis of the Bible. His other writings include *The Prophecies of the Risen Lord* (New York, 1879); *Disarmament of Nations* (1880); *The Kingdom* (1899); *The Church* (1901); *The Golden Rule* (1901); *Our Risen King's Forty Days* (1902); *The Problems of Jesus* (new ed., 1913).

BOARD OF TRADE. See TRADE, BOARD OF.
BOAR/FISH. A southern European fish (*Capros aper*) of the family Caproidae, having a much protracted hog-like snout. The body is oval, compressed, and carmine in color, with seven transverse orange bands on the back. The flesh is little esteemed.

BOAR'S HEAD, THE. The haunt of Shakespeare's Falstaff and his crew. It was a tavern in Eastcheap, London. It fell in the great fire of 1666. It was rebuilt, but had to give way for an approach to London Bridge. The site is now occupied by a statue of William IV.

BOAS, bô'as, EDUARD (1815-53). A German

author, born at Landsberg. He is remembered chiefly for his works on Goethe and Schiller, including *Nachtrage zu Schillers semmtlichen Werken* (3 vols, 1838-40), *Nachtrage zu Goethes sammtlichen Werken* (1841), *Schiller und Goethe im Xenienkampf* (1851). His *Schillers Jugendjahre* (1856) and *Schillers und Goethes Xenienmanuskript* (1856) were published posthumously by W von Maltzahn. His other works include *In Skandinavien, Nordlichter* (1844), the humorous novel *Des Kriegshommissar Papius Reise nach Italien* (1841), and the idyllic poem *Peputa* (1844). He published selections from his prose and poetical works in his *Schriften* (5 vols, 1846-48).

BOAS, FRANZ (1858-) A German-American anthropologist. He was born in Minden, Westphalia, studied at Heidelberg, Bonn, and Kiel, and in 1883-84 made a scientific journey through the Baffin's Land region. He was assistant in the Royal Ethnographical Museum in Berlin from 1885 to 1886. From 1886 to 1888 he was an associate editor of *Science*, from 1888 to 1892 instructor in anthropology at Clark University, and in 1899 was appointed professor of anthropology at Columbia University. He was curator of ethnology in the American Museum of Natural History in 1901-05, president of the American Anthropological Society in 1907-08, and of the New York Academy of Sciences in 1910. While connected with the American Museum, he planned and took part himself in the Jesup North Pacific Expedition, which disclosed interesting relations between the North Asiatic and Northwest American cultures, the *Reports*, which continue to appear, have been prepared under his editorship. In 1912 Oxford University conferred upon him the degree D.Sc. He wrote *Baffin's Land* (1885), "The Central Eskimo," *Sixth Annual Report, United States Bureau of Ethnology* (1888), *Tsimshian Texts* (1902), *The Growth of Children* (1904), *Changes in the Form of Body of the Descendants of Immigrants* (1911), *The Mind of Primitive Man* (1911), editor of *Handbook of American Indian Languages* (1911), *An Anthropologist's View of War* (1912).

BOAST (origin uncertain) A term used in sculpture to define the first contour of a roughly hewn block before the working out of ornament and details. Portions of buildings that are designed for ornamentation, if in obscure places, are often left in this rude state.

BOAT (AS *bāt*, Ger *Boot*, cf Fr *bateau*, boat, from LL *batellus*, dimin of *battus*, *batus*, boat.) A small vessel propelled by oars, sail, or some form of engine or motor. The name is also applied to large vessels built to navigate rivers and interior waters and sometimes to large sea-going vessels, but in such cases it is ordinarily used as part of a compound word or expression, e.g., steamboat, ferryboat, canal boat, packet boat, etc. Boats are of numerous types and forms, representing the various developments of the raft and dugout principles, which may be said to meet in the framed open boat, as it embodies the hollow form of the dugout and the framing of the raft. The simplest form of boat is called a *punt* or *bateau*, and it is much used in shallow interior waters, where it is often propelled by pushing with a pole instead of using oars, it has a flat bottom and sides made of single boards. The *dory* is a variety of punt, but, being intended for use in rough water, it is deeper and more shapely

Dories are used in great numbers by fishing vessels. Small, shallow, framed boats are called wherries, or Whitehall boats. In the United States navy boats are of four types—*cutter*, *whaleboat*, *steamer*, and *motor boat*. The cutter type includes the dingies and launches, the former being smaller than the cutter, and the latter being larger, all are square-sterned. The whaleboat is sharp at both ends. Steamers resemble cutters in build, but are heavier, are partly decked and some have rounded or pointed sterns, the smaller steamers are frequently called steam-cutters, motor boats are of various types. *Gigs* and *barges*, now little used, are commonly of cutter build, but are longer, narrower, and of less depth, some gigs are of whaleboat form. Dingies usually have 4 oars, cutters and whaleboats from 6 to 14, gigs 5 or 6, barges 12 to 14, and launches 12 to 16. All are supplied with masts and sails to be used when desired. In modern men-of-war boats are stowed on skid-frames amidships in order to keep them out of the way of the guns, a certain number of davits are fitted, however, as a matter of convenience during ordinary service. The boats of merchant ships are of various types, and their number depends upon the size of the vessel and the character of the service, dories are much used in the United States coasting vessels, but large boats are usually carried; most deep-sea sailing ships have one large boat, called the *launch* or *longboat*, in addition to smaller ones.

Boats are usually built of wood, they are liable to receive many minor injuries, and the repair of an iron hull is a much more difficult matter than that of a wooden one, moreover, an iron boat is much more likely to punch a hole in her bottom or side in striking a sharp object than is a wooden one. There are three different methods of building wooden boats: the *carvel*, with fore-and-aft planks, the edges meeting but not overlapping, the *clinker*, also with fore-and-aft planks, but with the edges overlapping each other like shingles, and the *diagonal*, the planking of which runs diagonally, the inside planks running in a contrary direction to the outside ones and their edges meeting. On some steamers the number of passengers carried is so great that sufficient room cannot be found for boats of the ordinary type, and these vessels often carry a number of collapsible boats with wooden frames and covered with canvas. Boats are *single* or *double banked*, as they have one or two oars to a thwart. The seats for the crew of a boat are called *thwarts*, the strip on which the thwarts rest is called the *rising*, the space abaft the after thwart the *stern sheets*, that forward of the foremost thwart the *fore sheets*, the spaces for the oars the *rowlocks*, and where the coxswain of a man-of-war boat sits or stands, the *coxswain's box*.

Boat Davit When not resting inboard on chocks or skid frames, boats are carried at the davits. These are secured to the ship's side, the end resting in a socket or saucer (if the davits revolve), with a collar around the davit higher up and near the ship's rail. Davits are sometimes straight, but are usually curved somewhat in the shape of an inverted letter J (thus *J*). The upper blocks of the *boat falls* (see *Block*, also *Tackle*) are secured to the curved arms of the davits, and the lower blocks hook into rings in the boat. Boat davits are usually made of round iron bars, but stronger and lighter davits are made of T-rail iron or of box bidders. Me-

chanical davits of one form or other are provided on many ocean steamships to facilitate the launching of lifeboats.

Boat-Handling Apparatus. The size and weight of many boats now carried by ships preclude their being hoisted by davits, and all boats carried inboard on men-of-war require special apparatus. In the United States navy boats stowed on skid beams are usually handled by a *boat crane*, which is shaped somewhat like a boat davit, but is many times larger. The power to operate it is either steam or electric. The boats, when about to be hoisted, have wire-rope or chain contrivances called *slings* fitted to them, and the tackle of the boat-crane hooks in the rings of the slings. In the British navy large boats and those on the skid beams are handled with *boat derricks*, consisting of strong booms hinged at the heel in heavy sockets on the mast. *Lifeboats* are carried at davits of the usual pattern, but they have special apparatus for lowering them and for detaching them after they are lowered. There are many types of such devices in use; the general feature which is common to all is an arrangement whereby the boat is instantaneously released from the hoisting gear, and it is customary to detach the boat two or three feet above the water and let it fall the rest of the distance. In a rough sea it is very difficult to unhook the ordinary falls, and a failure to do so promptly might cause the boat to swamp or be crushed against the ship's side.

BOATBILL. A South American night heron (*Cancroma*, or *Cochlearia*, *cochlearia*), differing from the true herons mainly in the form of the bill, which is comparatively short and very broad, as shown in the accompanying illustration. It is about the size of a domestic fowl, has shorter limbs than most of the herons, but



HEAD OF A BOATBILL.

resembles them in plumage, and is abundantly provided with elongated feathers on the back of the head and neck, which it erects when irritated. The skin beneath the lower jaw is bare and distensible in a large gular pouch. Its general color is rusty red, the forehead and breast whitish. It inhabits Guiana, Brazil, etc., and stands in shallow water waiting for a favorable opportunity to engulf its prey in its capacious beak. Small fish and amphibians form its principal food. The note is a harsh croak. Another species (*Cancroma*, or *Cochlearia*, *zelendoni*) inhabits Central America. These are considered by some to form a subfamily, characterized by having four powder-down tracts, but it is probable that generic rank is sufficient to indicate their peculiarities. See HERON.

BOAT FLY. See WATER BUG.

BOATSWAIN, *naut. pron. bō's'n* (boat + swain, servant). An officer of the navy of warrant rank. On board ship he has, under the executive officer, charge of the rigging, anchors, cables, cordage, etc. He summons the crew at all general evolutions and acts as assistant to the executive in carrying on the business of the ship; on old-type ships his station was on the fore-

castle. A boatswain's *call* or *whistle*, which he uses in summoning the crew or to call attention as a preliminary to passing orders, etc., is his badge of office. Examinations for appointments to the grade of boatswain are held annually or oftener for those who are eligible. When a boatswain has served six years as such, he is, if he passes the prescribed examination, advanced to the grade of *chief boatswain* and commissioned with the rank of ensign. In 1913 there were 99 chief boatswains and 72 boatswains on the active list of the United States navy. The pay of a boatswain when at sea is \$1200 per annum, with an increase of \$200 for each three years of service until the maximum of \$2250 is reached. Chief boatswains receive the same pay as ensigns.

BOATSWAIN, or BOATSWAIN-BIRD. A sailor's name for two sorts of sea-wandering birds: (1) a jaeger, especially the parasitic jaeger (*Stercorarius parasiticus*); (2) a tropic bird (q.v.). The reference in each case seems to be to the long, pointed feathers in the tail, which suggest a marlin'spike, the boatswain's badge of office; in fact, skuas and jaegers are also known locally in New England as "marlin'spikes."

BO'AZ. See JACHIN.

BOBAC, bō'bác (Pol. *bobak*, Russ. *babakū*). A gregarious marmot or woodchuck (*Arctomys bobac*) of eastern Europe and Central Asia, which resembles the American prairie dog in appearance and habits.

BOBADILLA, bō'bá-dē'lyá, FRANCISCO (?-1502). A Spanish commander of the Order of Calatrava, appointed in 1499 to supersede Columbus as Viceroy of the Indies. He was fully empowered to conduct an investigation of the affairs of the colony of Hispaniola and set sail with two caravels from Cadiz in June, 1500. He was both insolent and inefficient, and he had no sooner landed in the island than he proceeded to high-handed and stupid demonstrations of authority. By his orders Columbus was seized, placed in chains, and sent back to Spain. The Admiral was, however, received with great consideration by the nation and court. In 1502 Columbus set out on his fourth and final voyage and arrived at Hispaniola on June 29. On the first of July Bobadilla, who, after his utter mismanagement had been recalled under arrest, left San Domingo in one of the vessels of a large fleet commanded by Torres and was drowned in a hurricane.

BOB'BIN (Fr. *bobine*, of uncertain origin). A small wooden or metal roller, flanged at one or both ends, on which thread or yarn is wound for sewing, weaving, etc. Bobbins for weaving are commonly made with a flange at one end only, but most other forms of bobbins are flanged at both ends. The ordinary "spool" on which sewing thread is wound is a familiar example of a wooden bobbin, and the metal implement for holding the thread in a sewing machine shuttle is a good example of a metal bobbin. The manufacture of bobbins, which are used in enormous numbers, is usually carried on by means of automatic machinery. In the manufacture of bobbins or spools for sewing thread the wooden blocks, cut to the proper length, are thrown into the hopper of the machine, whence they are taken automatically, turned, flanged, bored, and discharged complete and ready for use. See LOOM.

BOBBIN-BOY, THE. The nickname of Gen.

Nathaniel P. Banks, and the title of a boy's book founded on his life

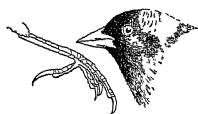
BOBBINET (*bobbín + net*) A machine imitation of pillow lace (See LACE) A cotton or linen fabric of hexagonal meshes, formed by a series of threads crossing and partially twisting around each other See BRUSSELS LACE

BOBBIO, bób'be-ó An episcopal city in Lombardy, province of Pavia, north Italy, near the confluence of the Bobbio and the Trebbia, 37 miles northeast of Genoa (Map Italy, D 3) In 612 St Columbanus founded an abbey here, whose famous library, consisting of 700 manuscripts, made known to the world by Niebuhr and others, is now partly in the Vatican, partly in the Ambrosian Library at Milan Pop., 1881 (commune), 4500, 1901, 4848, 1911, 4910

BOBIZATION In music, a general term denoting the various systems proposed by the theorists of the sixteenth and seventeenth centuries for naming the tones of the scale by syllables instead of letters Especially the semitone before the octave, B, was designated by a large variety of syllables (si, bi, ci, di, ni, ba, za) Consult II Riemann, *Geschichte der Musik-theorie* (Leipzig, 1898)

BOBOLI (bó'bó-le) **GARDENS** Magnificent gardens near the Pitti Palace, in Florence, Italy, planned in 1550, under the patronage of Eleanor of Toledo and the direction of the sculptor Tribolo

BOBOLINK (earlier *boblink*, *Bob o' Lincoln*, *bob-o-lincoln*, in imitation of the sounds produced by the bird) One of the most conspicuous and interesting song birds of North America, found wherever plains, prairie meadows, or cultivated fields offer it a suitable home It is a member of the Icteridae, but stands apart from the orioles and blackbirds by reason of its pointed tail feather and long middle toe, as *Dolichonyx oryzivorus* The length is about 7 inches, of which 2¾ inches go to the tail, the



HEAD AND FOOT OF BOBOLINK
Male in summer plumage

spring or breeding plumage of the adult male is black, with the hind head and nape, scapulars, rump, and upper tail coverts buff, inclining to ochraceous on the neck and ash toward the tail, in this plumage a popular local name is skunk blackbird The female is protectively denied this gay suit and is clothed in neutral yellowish brown, much streaked, and the young of both sexes wear a similar dress until the males mature (See Plate of BLACKBIRDS) For their nests they choose open grassy spaces or fields of cultivated grass and grain, and as the spreading cultivation of the country has multiplied these conditions they have dispersed much more widely, especially in the East, than they originally extended, and for a long time vastly increased in numbers Arriving from the South in May, a pair take possession of a field The female constructs on the ground a nest of grasses skillfully entwined and often ingeniously hidden among the stems of the growing plants, in which are laid four or five eggs (for description of birds' eggs, see EGG), dull white, flecked and marbled with vandyke brown, upon which she sits very closely for about a fortnight

During this nuptial season—from their first arrival until mid July—the male is driving from the vicinity every intruder he can frighten away, especially rivals of his own kind, by his gay activity upon the wing, and his loud, sprightly, and unceasing song, which has a peculiar ringing or *chinking* quality adapted to a rattling melody, seemingly uttered in an ecstasy too vivid to permit of any tune or modulation The bobolink goes through a complete midwinter molt in South America, when its plumage is chiefly black, but with almost all the feathers veiled with long buffy-yellow tips These gradually wear away (see MOLTING) until at the season of courtship the bird is clad in strong contrasting colors of black, buff, and white After the breeding months an autumn molt brings the male into rich ochre or yellow colors similar to those of the female This it wears until midwinter Then brilliant song dwindles to the call note, *Chink!* and in August the males gather upon marshy meadows in vast flocks, where they are gradually joined and followed by their families, and the southward migration begins By the end of September all the bobolinks have left the northerly parts of the country and are gathered upon southerly seacoasts or inland marshes At this time they are fat and along Chesapeake Bay and the Southern "sounds" are shot in immense numbers under the name *reedbirds* as an autumn delicacy Such as escape move on southward, and fall in enormous flocks upon the ripening rice fields of Carolina and the Gulf coast, where they are called *reebuds* Here they do very serious damage by eating the rice grains and more by slaking down a vast quantity So systematic and severe has been the destruction of these birds of late years that the species has been seriously diminished, and bobolinks are becoming rare in many parts of the northeastern United States and Ontario, to the sorrow of the people

BO'BRIKOV, NIKOLAI IVANOVITCH (1830-1904) A Russian general and official born at St Petersburg Having been thoroughly trained in military academies, he at once entered military life He rose rapidly in the government's favor, and in 1898 was appointed governor-general and commander in chief of the military district of Finland He ruthlessly carried out the policy of Russification aimed at the suppression of Finland's constitutional liberties He was endowed with dictatorial powers in 1903 and entered on a vigorous course of repression, including the expulsion of the most prominent Finnish leaders He was assassinated, June 16, 1904, by Eugene Schiaumann, the son of a former senator See FINLAND

BOBRINETTS, bób'brí-nyéts' A thriving town in the government of Kherson, south Russia, 120 miles north of the city of Kherson, on the high, rocky banks of the Bobrinets River, an affluent of the Bug (Map Russia, F 5) Flour milling, the manufacture of tobacco, and retail trading are its principal industries In the neighborhood of Bobrinets are interesting mounds Pop., 1890, 10,050, 1897, 14,350

BOBRUISK, bób-bró'y'sk A fortress of the first class and the capital of a district in the government of Minsk, Russia, 108 miles southeast of the city of Minsk (Map Russia, C 4) It is situated on the high right bank of the Bérésa, at the mouth of whose tributary, the Bobruisk, is a station for the steam packets navigating the Dnieper and Bérésa It con-

tains a departmental college and a military hospital. Manufactures include iron and flour, but are less important than its commerce, which consists principally of exports of grain and timber. During the reign of Alexander I it was fortified, and in 1812 it was ineffectually besieged by the French. Czar Nicholas I converted it into a fortress of the first class. In 1902 it was almost totally destroyed by a conflagration. Pop., 1897, 25,100.

BOBRZYNSKI, bób-zhin'skě, MICHAEL (1849-). A notable Polish historian, born at Cracow, in Galicia. He was educated at the place of his birth, graduating at both its gymnasium and its university. In 1872 he received the degree of LL.D. and the following year became assistant professor in the history of Polish jurisprudence, assuming similar duties with regard to German law in 1876. In 1877 he was made professor of law in the University of Cracow. From 1885 to 1891 he was a member of the Reichsrat and held many other honorary and responsible positions, and from 1890 to 1901 he was president of the Galician board of education. He became Governor of Galicia in 1908. His most important publications are his *Geschichte Polens* (1879), which aroused much criticism on account of its bitter attacks on Poland's past, and his contributions to Lenel's *Polnische Rechtsdenkmäler* (1874-82).

BOBS. A nickname given by his soldiers and by the English people to Field Marshal Earl Roberts.

BOB'STAY. See Plate of a full-rigged ship with article SHIP.

BOBWHITE. An American quail. See QUAIL.

BO'CA (Sp. *boca*, mouth, from Lat. *bucca*, cheek). A term applied to the entrance of various straits and rivers, chiefly in South and Central America. 1. *Boca Chica*, the deep channel, 28 miles in length, which leads to Cartagena, in Colombia. 2. *Boca de Nariños*, the largest and most southerly outlet of the Orinoco. 3. *Boca Grande*, a bay of the Caribbean Sea, at the mouth of the Zuenir, in Costa Rica. 4. *Boca del Toro*, in the Caribbean Sea, in Costa Rica, in lat. 9° 20' N. and long. 82° W. 5. *Boca Grande* and *Boca Chica* are the two channels connecting Darien harbor with San Miguel Bay, Panama. The bays of Almirante and Chiriqui, in Panama, are connected with the Atlantic by the bocas del Drago, del Toro, and del Tigre. 6. A village on the Southern Pacific Railroad in Nevada Co., Cal., is known by this name.

BOCAGE, bô'kážh, HENRI (1835-). A French dramatist, son of Pierre-Martin Toussiez Bocage, and younger brother of Paul Bocage. He is the author, alone or with collaboration, of several pieces which were successful on the Paris stage. Among them are the comedies *L'architecte de ces dames* (1869); *La comète de Damocles* (1871); *Le cadeau du beau-père* (1874); *Une fille d'Ève* (1875); *Les trois bougies* (1880); *En partie fine* (1884); *La vie à deux* (1890); and the comic operas *La girouette* (1880) and *Les poupées de l'enfance* (1881).

BOCAGE, MANOEL. See BOCCAGE.

BOCCAGE, PIERRE-MARTIN Toussez (1797-1863). A well-known French actor of the romantic period. He was born in Rouen. In 1826 he secured an engagement at the Odéon. There he had some success, but later at the Gaîté and Porte Saint-Martin theatres he found a more congenial opportunity in plays of a more melo-

dramatic character, such as *Alice, ou les fosses écossoises* and *Neugate, ou les voleurs de Londres*. Among his greatest successes were those in *Angèle*, *Antony*, *La tour de Nesle* and other pieces by Alexandre Dumas. From 1845 to 1848 he was director of the Odéon and later (1860) of the Théâtre Saint-Marcel. His final achievement was in the production, at the Ambigu, of *Les beaux messieurs de Bois Doré* (1862).

BOCAS DEL TORO, bô'čas del tó'ro. A port in the republic of Panama, on an island of the same name, in one of the entrances to the Chiriqui Lagoon or Bay (Map: Central America F 6). Pop., about 5250. The most important article of trade is the banana, which is exported in great quantities. Other exports are coco nuts, sarsaparilla, india-rubber, hides, and turtle shells.

BOCA TIGRIS, bôk'a tē'grīs (Portug. trans of Chinese *Hu-Men*, the tiger's mouth or gate) or **THE BOGUE**. A passage in the Canton River China, between the island of Tycoektow on the west and the islands of An-ung-hoi and Chuen-pi on the east. It is about 2½ miles wide, and below it the Canton River expands into a broad estuary. The Boca Tigris contains a number of small islands, with remnants of old forts, which were repeatedly taken by the British. At present the entrance is guarded by modern fortifications.

The "Bogue Forts," so called after the Bocas Tigris, are forts of granite masonry, erected by the Chinese on the rocky islands in the channel of the Boca Tigris, to defend the approach to the city of Canton. One remarkable island mass of rounded granite with precipitous sides rising to a height of about 400 feet, seemed to the Chinese as a tiger's head, though Europeans imagine that of an elephant. These forts were captured by the British in 1841 and again in 1850; but they were rebuilt, and are now supplied with heavy armament of the latest style of Krupp and Armstrong factories.

BOCAUE, bô-kou'ă. A town of Luzon, Philip pines, in the province of Bulacan. It is situated about 4½ miles northeast of Bulacan, a short distance from the railway line (Map: Luzon E 7). Pop., 1903, 8438.

BOCCACCINO, bôk'kât-chē'nô, BOCCACCIO (c 1467-c.1525). An Italian painter of the early Renaissance, belonging to the Emilian school. He was born in Ferrara and studied in his native town, probably under Domenico Panetti. Few facts of his life are known. He passed some time in Venice, where he was strongly influenced by Venetian painting. His principal artistic activity was in Venice, Ferrara, and especially in Cremona, where he founded a school in which Garofalo was a pupil. His most celebrated achievement is the frescoes in the cathedral of Cremona, (1506-19) representing the "Birth of the Virgin" and some subjects from her life. His remaining works, which include the "Marriage of St. Catharine" (Venice Academy), the "Virgin and Child with Four Saints" (Venice San Giuliano), the "Virgin and Two Saints" (Cremona, San Quirilo), and the "Holy Family" (Paris, Louvre), are considered by Lanzi remarkable for richness of drapery, variety of color, spirit and grace of attitude, and harmony of landscape. Several works formerly attributed to Perugino, Pinturicchio, and Garofalo are now ascribed to Boccaccino. His son and pupil CAMILLO (1501-46) was a painter at Cremona.

BOCCACCIO, bók-kat'éhó, GIOVANNI (1313-75). Author of the *Decameron*, the third of the *Three Crowns* of Italian literature, the great master and model of classic Italian prose, and the greatest of modern story-tellers. He was born (probably in 1313, and surely not later than July 20, 1314) in Paris, the illegitimate son of Boccaccio di Chellino, a Florentine merchant, and a French noblewoman, whose first name was Giovanna (Jeanne). Reared in Florence, Boccaccio was sent about 1323 to study accounting in Naples. Finding this un congenial, he turned to canon law, which also he left for classical and scientific studies and the gay life of the court of King Robert of Naples, a brilliant centre of culture and learning. Here he made powerful and stimulating friendships, his mind was enriched in cultivated surroundings, his sensibilities were sharpened to the natural beauty of Naples, and his emotional nature expanded in a sympathetic, sensuous luxury. The great episode in his life at this time was his love for Maria de' Conti d'Aquino—for "Fiammetta," as she is called in some of his writings—a love which touched all the chords of emotion in Boccaccio, from exquisite happiness while she was faithful to him, to bitterest jealousy and despair after she left him for others. For her he wrote his earliest Italian romances, and his experiences with her brought him a deep insight into human nature and feeling. Financial difficulties recalled Boccaccio to Florence in 1340, and during the next years he is almost lost to view. In 1346 he was living with Ostasio da Polenta at Ravenna, in 1348, with Francesco Ordelaffi at Forlì. He settled, after a short trip to Naples, in Florence, where he was living in 1351. For his native city he performed various diplomatic services in Bologna (1351), the Tirol (1351), Avignon (1354 and later in 1365), and Rome (1367). In 1351 also he had earned to Petrarch in Padua a nomination to a professorship in Florence. Boccaccio had met Petrarch, in 1350, in Florence. His acquaintance with the great poet ripened into a sincere affection, which sustained Boccaccio in the difficult years to follow, encouraging him in his studies and writing, steadying his mental and moral poise. Their correspondence was uninterrupted till Petrarch's death, in 1374. In 1362 Boccaccio was invited to Naples by his friend Nicola Acciaiuoli, who promised him the patronage of Queen Joanne. His cold reception led him to seek the consolation of his friend Petrarch in Venice (1363). Rejecting Petrarch's offer of a home, he returned to the poverty of his Certaldo estate. His last years were brightened by his appointment as lecturer on Dante in Florence in 1373, but the course was interrupted by illness in 1374. Since 1354 a great change had come over Boccaccio's view of life. The bitterness of his emotional experiences had inclined him to disgust with the world and to religious meditation. These tendencies became very definite after a visit to him in 1362 of a monk, Gioacchino Ciani, who brought him the dying message of a certain Fra Pietro Petroni, urging him to repent. Boccaccio regarded the poverty of his last years as a direct judgment of God on his youth. His retirement to Certaldo in 1374 was a definite renunciation of the world. He died there, Dec. 21, 1375.

Aside from the *Decameron*, Boccaccio's writings include (1) The *Filosofo* (1331-38), his first and longest work of fiction, which was writ-

ten for Maria d'Aquino. It deals with the fundamental theme of Fleur and Blanchefleur, two youthful lovers, separated by adversity, and reunited after many adventures. The naive tale of mediæval France is adorned by Boccaccio with a curious conglomeration of pagan and chivalric legends, of classic mythology and mediæval Christianity. A certain importance attaches to the discussions of love on the background of Neapolitan society of the day, and to the personal revelations concerning himself and Maria, which Boccaccio has woven into the story. Greater psychological acumen appears in (2) the *Filosofo* (the story of Troilus and Criseis, written c1338) and (3) the *Teseide* (the story of Palemon and Arcite, written c1341), both poems in the octave stanza, inspired by Boccaccio's own love affairs and interesting as sources of Chaucer's *Knights Tale* and *Troilus*. A third poem in octaves (4), the *Ninfale Fiesolano* (the love of Adonis for a nymph of Diana, and the founding of Florence through their son Prunco), shows a great advance in artistry, in the delicacy and sincerity of its sentiment and pathos, and in the simplicity of its form, whereas in (5) the *Ameto* and in (6) the *Amorosa visione* the warmth of biographical motivation is smothered under a cold and perfunctory allegory of love. Just as the *Ameto* is the first great pastoral romance, so (7) the *Fiammetta* is the first great psychological novel. Here, under the names of Panfilo and Fiammetta, Boccaccio relates, with inverted rôles, the story of his abandonment by Maria. Even though the analysis of sentiments, especially of jealousy, is hampered by an excess of classical illustration, it is profound, acute, and sincere, and there is much of the same rich objectivity in setting that we find in the *Decameron*. In (8) the *Comaccio* (written c1354-55) he vents in a satirical allegory on the wiles of women his resentment at his disillusion in love, and hints at that weariness with worldly things which characterizes the later years of his life. In fact, the *Decameron*, finished in 1353, seems to have exhausted one phase of Boccaccio's nature, his gaiety and mundanity. Between 1351 and 1360 we have (9) a work of ponderous erudition, the treatise *De genealogia deorum gentium*, followed (1356-64) by (10) the *De casibus virorum illustrium* and the *De claris mulieribus* and (1366) by the scientific *De montibus*, all works of distinctly mediæval type, without the historical perspective so notable in Petrarch's humanism. (11) The *Vita di Dante* and the *Commentary* on the *Comedy* also belong to this later period. The notable (12) *Ecolgues* in Latin and (13) his Italian verses retrace in part the ground covered in his romances.

If Boccaccio had died in 1348, the minor works already produced would have made him an important figure among the lesser contemporaries of Petrarch and Dante. It was the *Decameron*, written between that year and 1353, which gave him a place among the greatest writers of all time. Purely extrinsic considerations make the *Decameron* a work of the first importance. In it Boccaccio gathers together from all sources—from the French *fabliaux*, from the classics, from current folklore and contemporary life—all those fundamental human situations, tragic, comic, practical, ethical, which confront human existence in its most universal aspects. In this respect the *Decameron* has been a storehouse

for all writers of fiction from his own time to the present. His imitators include hundreds of writers, from masters like Shakespeare to geniuses like D'Annunzio. The perfection of his art has likewise made him a universal model for story-telling: he isolates with absolute clearness the "point" of his situation, develops it with characters visualized in their most living and essential features, and his exposition proceeds with the greatest expedition and economy to the climax and conclusion. In a narrower field, that of Italian prose, his influence, like that of Petrarch, has been tremendous; for the Renaissance, with its doctrine of *imitation*, set up the *Decameron* as the criterion of prose excellence, choosing, however, with typical perversity the occasional involution of his periods as the essence of his art. So that here its influence was mostly bad. The *Decameron* finally offers an encyclopædic panorama of contemporary life and manners, representing people from every walk of life, but especially from the middle classes, in their objective reality, living, moving, feeling, revealing themselves in their inmost souls. All this makes the *Decameron* interesting. But the vital principle which makes it immortal is Boccaccio's own æsthetic vision. In the representation of the tragic, the heroic, the virtuous, Boccaccio is out of his natural field; he becomes rhetorical, abstract, and inclined to exaggeration. His creations move as though out of touch with reality. If his patient Griselda has survived, it is not for her virtue but for her pathos as a suffering, neglected wife. It is rather when Boccaccio comes to his characters with the pure delight of concrete portrayal that he attains perfection. And his own best insight was for the uglier sides of human nature in their more venial manifestations. Here we have the true field of the comic. Boccaccio's laugh is the quintessence of laughter. He penetrates behind every pose, every self-deception of his people, and brings them face to face with reality, and this reality and this pose are visualized by him in their completeness and essence. There is no phase of life that escapes his comic vein. He riots in lechituousness and at least skims the surface of sacrilege, not because his genius was more perverse, but because his available materials were more plentiful. In the comic field he attains the heights reached by Dante in his treatment of human aspiration. He has the same grasp of human nature, the same power of objectifying his vision.

Consult E. Hutton, *Giovanni Boccaccio: A Biographical Study* (New York, 1910; trans. by T. Wright, London, 1874; complete ed. of all works, by Moutier (Florence, 1827-34); expurgated ed. of *Decameron* by Fornaciari (Florence, 1900).

BOCCAGE, bók-kázh', or **BOCAGE**, MANOEL MARIA BARBOSA DU (1765-1805). A popular Portuguese poet, born at Setúbal. He was admitted to the army at the age of 14 and served in the East Indies, in 1786 in the navy, and three years later as lieutenant of cavalry. Subsequently he deserted, and returned to Lisbon (1790), where he soon became the most distinguished member of the circle of young poets known as the *Nova Arcádia*. His eager advocacy of the cause of the French Revolution found an organ in certain poems, notably "Verdades Duras," but activity in this direction was short-lived. The revolutionary and atheistic tone of his writing gave the

authorities offense; in 1797 he was arrested and imprisoned, and eight years later he died, without having recovered his old leadership. The quality of Boccage's poems is extremely uneven. He had an unusual gift for improvisation and wasted himself to a large extent upon verse of that sort, often upon the most frivolous subjects. Yet among his poems there are some of high order—sonnets that are little masterpieces of polished verse and amply justify the admiration of his contemporaries; while the popular and national spirit that animates them is the new note which he introduced into Portuguese literature and which later found further expression in the younger national school led by Almeida-Garrett and Castilho. An excellent biography of Boccage, by Braga, forms the introduction to the latest edition of his poems (Oporto, 1876). The most complete edition of his works is entitled *Rimas* (5 vols., Lisbon, 1806-14).

BOCCAGE, bók-kázh', MARIE ANNE FIQUET DU (LEPAGE) (1710-1802). A French poetess, remarkable chiefly for the praises she inspired as "Venus in form, Minerva in art." She was a member of the academies of Rome, Bologna, Padua, Lyons, and Rouen. She imitated Milton in 'An Earthly Paradise' (*Paradis terrestre*) (1748) and wrote also miscellaneous *Poems* (1746) and *La Colombade* (1756). Her letters to her sister while traveling in England, Holland, and Italy have still an interest that is not inherent in her verses.

BOCCALINI, bók'ká-lé'né, TRAJANO (1556-1613). An Italian satirist, born at Loreto. Under Gregory XIII he held several offices, the most important being that of Governor of Benevento. In an age of conventionality, hypocrisy, moral apathy, and routine thought Boccacini stands out as an exponent of free intelligence, disinterested citizenship, political and economic justice, sane literature, and aggressive humanity. His principal work, 'Dispatches from Parnassus' (*Ragguagli di Parnaso*), is a satire of perennial interest for its solid mentality and cogent humor. It exerted considerable influence on Swift and Addison. In his *Pietra del paragone politico* he assailed Spanish domination in Italy with a view to national independence. His *Commentaries on Tacitus* attack political absolutism and favor modified democracy. Consult G. Rua, *La letteratura civile* (Milano, 1910). The best edition of the *Ragguagli* is that of Rua (Bari, 1910); Eng. trans., anonymous (1704) and by Hughes (London, 1706).

BOCCE DI CATTARO, bók'ká dè kát'tá-rò. See CATTARO, GULF OF.

BOCCHERINI, bók'ká-ré'né, LUIGI (1743-1805). An Italian composer and violoncello virtuoso. He was born in Lucca, Feb. 10, 1743. He was the son of a contrabassist, who instructed him on the violoncello. Afterward he studied in Rome and traveled through Italy and Germany, playing in concerts with success. He went to Paris (1768) and to Madrid (1769) and became composer and violoncellist in the Chapel of the Infante Don Luis, which post he held until 1785. Owing to impaired health, he fell into poverty, and was aided by friends. He is the greatest Italian representative of the new style of instrumental music originated by Stamitz (q.v.) and the composers of the Mannheim school. Even in his very earliest works Boccherini exhibits a remarkable mastery of form and a surprising originality in figuration

and dynamic expression far superior to the early works of Haydn, who, before the rediscovery of Stamitz, had been regarded as the 'father' of instrumental music. A leaning towards sentimentality and mere virtuosity has caused Boccherini's works to fall into rather undeserved neglect. His works (many of them of striking beauty) consist of 91 string quartets, 125 string quintets, 18 quintets for strings and flute, 54 string trios, 16 sextets, 2 octets, 4 concertos for 'cello, 20 symphonies, 2 oratorios, 1 opera, 1 mass, 1 Stabat Mater, and numerous violin sonatas. Consult L. Picquot, *Boccherini* (Paris, 1851). D. M. Ceiu, *Cenni intorno alla vita e le opere di Luigi Boccherini* (Lucca, 1864). H. M. Schletterer, *Boccherini* (Leipzig, 1882).

BOCCUS, bōk'kūs (Gk. Βόκκος, *Bokchos*). 1 King of Mauretania and father-in-law of Jugurtha. With Jugurtha he made war against the Romans, but afterward (106 B.C.) delivered him up to Sulla, the questor of Marius (Sallust, *Jugurtha*, 80-120, Plutarch, *Marius*, 8-32). 2 A son of the preceding (?-33 B.C.). In the early part of his career he reigned over Mauretania with his brother, Bogudes. After assisting Caesar in his war against the Pompeians in Africa, he was rewarded with a part of the Kingdom of Masimissa. After the murder of Caesar, Bocchus sided with Octavianus and Bogudes with Antony, and during his brother's absence in Spain Bocchus usurped the sole government of Mauretania, in which he was confirmed by Octavianus. After his death his kingdom became a Roman province.

BOCHART, bō'shā', SAMUEL (1599-1667). A noted French Orientalist and Protestant divine. He was born in Rouen, studied in Paris, Sedan, Saumur, Oxford, and Leyden, and then became pastor of the Protestant church in Caen, where he remained for 42 years. In 1629 he gained great reputation by his victory, in a public discussion of several days' duration, over the famous Jesuit Père Veron. From 1646 to 1651 appeared his *Geographia Sacra*, and in 1663 his *Hæresicon* (2 vols.), or Scripture zoology, to which he devoted many years of his life. In 1652 he was invited to Stockholm by Queen Christina and went thither, accompanied by his friend Huet. Court life, however, did not suit him, and his visit was short. The fourth edition of his complete works was published in three volumes (1712).

BÖCHER, bō'shā', MAXIME (1867-) An American mathematician, born in Boston, and educated at Harvard and Gottingen. At Harvard he became instructor in mathematics in 1891, assistant professor in 1894, and professor in 1904. He was one of the editors of the *Annals of Mathematics* in 1896-1900, 1901-07, and again in 1911, and (with L. E. Dickson) editor of the *Transactions of the American Mathematical Society* in 1907-09 and after 1910. In 1908-10 he was president of the American Mathematical Society. His publications include *Ueber die Reihenentwicklung der Potentialtheorie* (1894), *Introduction to Higher Algebra* (1907, Ger. trans. by Hans Beck, 1910), *Introduction to the Study of Integral Equations* (1909).

BOCHNIA, bōk'nī-a. A town of Galicia, Austria-Hungary, situated about 24 miles by rail from Cracow (Map Austria, G 2). It has in its vicinity extensive salt and gypsum mines and is the seat of thriving industries and trade.

Pop. of judicial district in 1910, 47,987, including 3000 Jews.

BOCHOLT, bōk'olt. A town in the Prussian province of Westphalia, on the Aa, 35 miles west by south of Münster. It is the seat of the cotton industry of Westphalia, and manufactures hearths, leather, iron, and trimmed lumber. Pop., 1890, 13,000, 1900, 21,200, 1910, 26,404.

BOCHUM, bōk'um. A town in the Prussian province of Westphalia, about 9 miles east of Essen (Map Prussia, B 3). It is a centre of the iron, steel, and coal industry of Westphalia, which gives employment to thousands of men. Bochum possesses five churches, a gymnasium, a school of mining and metallurgy, and a theatre. There are cast-steel works, foundries, and coalpits, and manufacturing of tin and zinc ware, carpets, calcium carbide, and paper roofing. The town owns its water supply, a modern sewage system, and a slaughterhouse, and is governed by a municipal council of 24 members, electing an executive board of 7. (See PRUSSIA, *Local Government*.) Pop., 1890, 47,601, 1900, 65,600, 1910, 136,916.

BOCK, KARL ERNST (1809-74). A German anatomist and medical writer. He was born in Leipzig, studied at the University of Leipzig, and was appointed professor there in 1839. He wrote, in popular style, a number of successful and frequently translated works, such as *Handbuch der Anatomie des Menschen* (2 vols., 1838, 4th ed., 1849), *Anatomisches Taschenbuch* (1839, 5th ed., 1864), *Hand-Atlas der Anatomie des Menschen* (1843, 7th ed., 1890), *Lehrbuch der pathologischen Anatomie und Diagnostik* (1848), *Das Buch vom gesunden und kranken Menschen* (1855, 16th ed. by Camerer, 1897), *Vollst. Gesundheitslehre* (1865, 7th ed., 1890), *Bau, Leben und Pflege des menschlichen Körpers* (1868, 17th ed., 1900).

BOCK BEER. See BEER.

BOCKELSON, JAN. See JOHN OF LEYDEN.

BOCKING, bō'king, EDUARD (1802-70). A German jurist of note. He was born in Tiarsbach, studied in Heidelberg, Bonn, Berlin, and Gottingen, and in 1829 was appointed professor of law in Bonn. He was deeply learned in historical jurisprudence and prepared a number of valuable critical editions of legal classics. These include *Corpus Legum sive Brachylogus* (1829), (with Kleuze) the *Institutiones* of Gaius and Justinian (1829), and *Notitia Dignitatum Utriusque Imperii* (1839-50). His other works include *Römisches Privatrecht*, *Institutiones des römischen Civilrechts* (2d ed., 1862), and editions of the works of Ulrich von Hutten and A. W. von Schlegel.

BOCKLIN, bōk'lin, ARNOLD (1827-1901). A Swiss landscape painter. He was born in Basel and studied in Düsseldorf (under Schümel), in Brussels, Paris, and Rome. He returned to Germany in 1856 and lived in Hanover and then in Munich, where Count Schack, afterward his chief patron, was first attracted by his talent. In 1860 he was appointed professor at the newly founded art school in Weimar, but resigned in 1862 to revisit Italy, whence in 1866 he returned to his native Basel. In 1871-74 he was again in Munich, then made Florence his home until 1885, and returned there in 1892, having in the meanwhile resided in Zürich. Although an artist of the highest rank, he was understood by only a few, was often ridiculed even by his fellow artists, and never became popular. Endowed with wonderful creative

power and a grandly picturesque imagination, he painted only what poetically interested and inspired him, caring little for the public, and, while fantastic and sensational in the choice of his subjects, was always original in his design and fascinating in his manner of painting. Notable for his fine color tones and poetic apprehension, he was an exceptionally fine delineator of southern nature, but in his figures only too often seemed to be impelled by the wish to represent the eternal contrast between beauty and ugliness. Hence the most perfect and enjoyable of his creations are those in which the landscape portion preponderates and his landscapes pure and simple. Some of his most noteworthy pictures are: "Castle by the Sea Surprised by Corsairs," "Chase of Diana," both in Basel Museum; "Venus Reposing," "Pan in the Rushes" (Munich Gallery); "Villa by the Sea," "Centaur Struggle," "Pan's Terror," "Anacreontic Shepherd Boy," "The Isle of the Blessed" (National Gallery, Berlin). Many of his finest paintings are in private collections in Germany and Switzerland. In public collections the largest number is in the Schack Gallery, Munich, among which is the "Sea Idyl," one of his most original compositions, and a great masterpiece from the coloristic point of view. Next in importance are the collections of the Museum of Basel and of Freiherr von Heyl, Darmstadt. His drawings are most numerous in the museums of Darmstadt and Basel and the Royal Graphic and Maillinger collections of Munich. Consult: Lehrs, *Arnold Böcklin, ein Leitfaden zum Verständnis seiner Kunst* (Munich, 1897); Heinrich Brockhaus, *Arnold Böcklin* (Leipzig, 1901); Württemberger, *Arnold Böcklin* (Berlin, 1912); Ostini, in *Künstler Monographien* (Bielefeld, 1904). The most complete series of reproductions of his works was published in 4 vols. (Berlin, 1892-1901), with bibliography by H. A. Schmid.

BOCLAND (AS. *bōcland*, bookland, charterland, from *bōc*, book, charter), or **BOOKLAND**. In Anglo-Saxon law, land held in free tenure by grant (i.e., deed or charter) from the crown made with the consent of the Witan (q.v.). It is contrasted with *folcland* (q.v.), or land held, without written title, by customary law. The term does not describe a particular form of tenure, feudal or non-feudal, nor was bocland necessarily allodial in the sense of being held absolutely and independently of any superior. It seems that the distinguishing characteristic of such a title was that it derived all its qualities and incidents from the deed or charter creating it. Folcland, being governed by the customary or common law, must have presented uniform qualities, as of heritability, alienability, etc. But every tenure of bocland might be different from every other. It might be inheritable or not, or inheritable only by a certain class of heirs. It might be alienable or not, or alienable only to a limited class of persons. It might be allodial, in the later meaning of that term, as free from the claims of any superior lord, or it might be held by a feudal tenure of the most restricted and burdensome sort. Originally grants of bocland were made only to religious corporations, but they came in time to be available to laymen also. Consult: Digby, *Introduction to the History of the Law of Real Property* (4th ed., Oxford, 1892); Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899); Lee, *Historical Jurisprudence* (New York,

1900); Pollock, *The Land Laws* (London, 1887); Kemble, *Anglo-Saxons*; Stubbs, *Constitutional History of England*. See **ANGLO-SAXON LAW**.

BOCQUILLON-WILHELM, bō'kē'yōn' vē-lān', GUILLAUME LOUIS (1781-1842). A French musician. He was born in Paris, studied at the Paris Conservatory, was instructor in music at the College of Saint-Cyr, and from 1810 professor of vocal music at the Lycée Napoléon (afterward the College of Henry IV). In 1835 he was appointed superintendent of vocal music in the public schools, in 1838 in the universities. The classes he thus organized, combined with the workingmen's evening classes later established, formed the basis of the Orphéon, whence was developed the French system of choral societies. He set to music Béranger's songs and published a number of valuable pedagogical works on singing.

BÓCSKAY, bōch'kō-ē, STEPHEN (1557-1606). A Hungarian national leader. He was brought up at the court of the Bathorys and in 1604 headed the Hungarians in their revolt against Rudolph II of Austria, who was aiming at the overthrow of Protestantism. After defeating the Imperial troops in several battles, he was proclaimed Prince of Transylvania (1605), was recognized as such by Sultan Ahmed I and was also invested with the supreme power by the Estates of Upper Hungary. In 1606 he concluded the Peace of Vienna with Rudolph II and thereby secured religious freedom to the Protestants of Hungary. Bocskay was supposed to have been poisoned by his chancellor when he died soon after becoming Prince of Transylvania. Consult Szilágyi, *Monumenta Comitatus Regni Transylvanie* (Budapest, 1879).

BOD, or **BOD-PA**. The name of the Tibetans proper, inhabiting the southern part of the country, the fertile, settled, and more or less civilized regions. See **TIBET**.

BODE, BOYD HENRY (1873-). An American professor of philosophy. He was born at Ridott, Ill., graduated from the Yankton (S.D.) College, and received a Ph.D. from Cornell in 1900. After serving for several years as assistant professor of philosophy at the University of Wisconsin, he was appointed (1909) professor at the University of Illinois. He was elected a member of the American Philosophical Association and served as vice president of the Western Philosophical Association in 1911-12. He published *An Outline of Logic* in 1910.

BODE, bō'dē, JOHANN ELEERT (1747-1826). A German astronomer. When a boy, he made astronomical observations from the garret of his father's house, with a telescope constructed by himself, and at the age of 18 calculated an eclipse of the sun. The next year he wrote on the solar eclipse of August 5, and in 1772 became astronomer of the Academy of Sciences at Berlin. He also wrote several popular works on astronomy, one of which, *Anleitung zur Kenntniss des gestirnten Himmels* (1st ed., 1768; 11th ed., 1858), was especially successful. He was appointed director of the Berlin Observatory in 1786 and held the post until the year before his death. In 1774 he founded the *Astronomisches Jahrbuch*, which is still continued, he himself editing no fewer than 54 volumes. His *Repräsentation des Astres*, in 34 sheets, containing all the stars visible to the naked eye above the horizon at Berlin, together with the most important telescopic stars, appeared in 1782. But his fame rests chiefly on the *Uranographia*,

published in 1801, in which he included 17,240 stars, or 12,000 more than can be found in any previous charts. Bode reproduced the statement of the relations of the planetary distances, previously made known by Titius of Wittenberg, but afterward called "Bode's Law" (q v).

BODE, JOHANN JOACHIM CHRISTOPH (1730-93) A German musician and translator, born in Brunswick. He was at various times an oboist, instructor in music and languages, composer, editor, printer, and translator. His translations, including Burney's *Present State of Music in Germany*, Tristram Shandy (1774), the *Vicar of Wakefield* (1776), and the *Essays of Montaigne* (1793-97), had decided influence on German literature. Consult Bottiger, *Bodes literarisches Leben* (Berlin, 1796).

BODE, WILHELM (1845-) A German art critic. He was born at Calvorde, Brunswick, and began his career as a jurist, in 1869, however, changing to the study of art and archeology in Berlin. In 1872 he was appointed assistant in the Berlin Museum, in 1883 director of the Department of Christian Sculpture, and in 1890 director of the Gallery of Paintings. The remarkable development of the Berlin Museum into one of the foremost collections of the world is due chiefly to his able management. In 1905 he was named General Director of all the Royal Museums in Prussia, and in 1909 actual Privy Councillor with the title "Excellency." He became a member of the academies of Berlin, Munich, and Amsterdam, and received the Prussian Order of the Red Eagle, etc., and in 1914 hereditary nobility was conferred upon him. His astonishingly wide knowledge of art includes every branch since the Middle Ages. It is most profound in Dutch and Flemish paintings and in Italian and German sculpture. In America, especially, his attributions are considered final. Of his many works, the principal are *Studien zur Geschichte der holländischen Malerei* (1883), *Geschichte der deutschen Plastik* (vol 1 of the *Geschichte der deutschen Kunst*, 1885), *Italienische Bildhauer der Renaissance* (1887), *Rembrandt, Beschreibendes Verzeichniss seiner Gemälde, Geschichte seines Lebens und seiner Kunst*, with Hofstede de Groot (8 vols, fol, also in French and English, 1897-1900), and *Kunst und Kunstgewerbe am Ende des 19 Jahrhunderts* (1901). He also edited the *Denkmale der Renaissance-sculptur Toscanas*, published by Bruckmann (Munich, 1892-1903), *Florentiner Bildhauer der Renaissance* (1902, Eng trans, 1908), *Rembrandt und seine Zeitgenossen* (1906), Eng trans, *Great Dutch and Flemish Masters of the Seventeenth Century* (1909), *Italian Bronze Statuettes of the Renaissance* (3 vols, 1908-12).

BODEN-SEE, bô'den-zâ' See CONSTANCE, LAKE OF.

BODENSTEDT, FRIEDRICH MARTIN VON (1819-02). A German poet and journalist. He was born in Peme, April 22, 1819, and educated for commerce, but forced his way to the university, studying in Göttingen, Munich, and Berlin, after which he lived three years as tutor in Moscow, making excellent translations of poems by Pushkin, Kazloff, and Lermontoff (1843). In 1843 he became instructor in the gymnasium in Tiflis and in 1845 published a translation of Russian folk songs under the title of *Poetische Ukraine*. In Tiflis he prosecuted Oriental studies under a Tatar teacher (Mirza Schaffy),

and began those imitations of Persian thought which under the name of this teacher suggest FitzGerald's *Omar Khayyam*. Later he traveled widely in the Caucasus and the East, and as a result wrote *Die Völker des Caucasus und ihre Freiheitskämpfe gegen die Russen* (1848) and *Tausend und ein Tag im Orient* (1850). Poems from this book, with others, were collected as *Lieder des Mirza Schaffy* (1851). Their warm imagery, their sensuous joyousness, and their melodious charm claimed general applause. The book has passed through 150 editions and has been translated into nearly all European languages. A continuation, *Aus dem Nachlass des Mirza Schaffy* (1874), was more serious and less successful. Bodenstedt was for a time a very efficient director of the noted theatre in Meiningen. In 1881 he lectured in the United States *Vom Atlantischen zum Stillen Ocean* (1882) is an account of this journey. His part in the translation of Shakespeare's works, undertaken by the German Shakespeare Society, is also noteworthy, as are his autobiographical *Erinnerungen aus meinem Leben*. He wrote many tales and some dramas, but his talent showed to greatest advantage in his translations and adaptations. He made himself a permanent place in German literature as the poet of Mirza Schaffy. Consult Stern, *Studien zur Literatur der Gegenwart* (Dresden, 1895), and Baker, *Literary and Biographical Studies* (London, 1903).

BODENSTEIN, bô'den-stên See CARLSTADT. **BODE'S (bô'dez) LAW** An arithmetical relation which is supposed to establish a connection between the distances of the planets from the sun. It may be thus stated. Write, in the first instance, a row of fours, and under these place a geometrical series beginning with 3, and increasing by the ratio 2, putting the 3 under the second 4, and by addition we have the series 4, 7, 10, etc., which gives nearly the relative distances of the planets from the sun.

4	4	4	4	4	4	4	4	4	4
4	7	10	16	24	48	96	192	384	

Thus, if 10 be taken as the distance of the earth from the sun, 4 will give that of Mercury, 7 that of Venus, and so forth. The actual relative distances are as follows, making 10 the distance of the earth.

Mercury	Venus	Earth	Mars	Asteroids
39	72	10	152	265
Jupiter	Saturn	Uranus	Neptune	
520	954	1918	3005	

Close as is the correspondence between the law and the actual distances, except in case of Neptune, no physical reason has been given to account for it, and there is little probability that such exists. Bode's law, therefore, in the present state of science, is purely empirical. Titius was the first to perceive the law, and Bode argued from it that a planet might be found between Mars and Jupiter, to fill up the gap that existed at the time in the series. The discovery of the asteroids has proved the correctness of this prediction.

BODIE, or BOD-Y'S ISLAND. A sand strip in Dare Co., N C, between Albemarle and Roanoke sounds and the Atlantic Ocean (Map North Carolina, G 2). The sand is shifting in character, inlets from the ocean appearing and disappearing from time to time. Naghead, a

popular seaside resort, is built upon the site of a former inlet of that name. There is a first-order light in lat. 35° 40' N. and long. 75° 33' W., at a height of 156 feet above sea level.

BODIERON, bö'di-ēr'ōn (origin obscure). The green rock trout (*Hewagrammos lagocephalus*) of Puget Sound and northward, known to the Cape Flattery Indians as teebarquā. It resembles other rock trout, especially the boregat, but its flesh is greenish. See ROCK TROUT.

BODIN, bö'dän', JEAN (1530-96). A French writer on politics, born in Angers. He was a lecturer on law in Toulouse, and subsequently practiced as an advocate of the Parlement of Paris, before he devoted himself to the study of political theory. His exceptional talents, and the positive attitude he assumed in support of the doctrine of absolute monarchy, gained him the good will and protection of Henry III and of his brother, the Duc d'Alençon. With all his leanings toward conformity in politics and religion, Bodin was an enemy of persecution, and his antagonism to the course adopted by the ultra-Catholics cost him the favor of his royal patrons. At the States-general of Blois in 1576 Bodin, as a representative of the Third Estate from Vermandois, succeeded in securing an interim of peace and toleration for the adherents of the Reformed religion. After the assassination of the Duke of Guise in 1588, Bodin joined the League, but was expelled not long after for his lukewarm Catholicity and spent the rest of his life in retirement. He died in Laon in 1596. In his *Methodus ad Facilem Historiarum Cognitionem*, published in 1566, Bodin already gave evidence of a philosophical spirit and a deep store of learning; the appearance, 10 years later, of his *Six livres de la république* assured him almost from the first the leading place among the political writers of the Renaissance not even excepting Machiavelli. By his vast erudition and bold grasp on the principles underlying historical fact, Bodin, in the estimation of modern authorities, deserves a place with Aristotle and Montesquieu as one of the three greatest political philosophers in history. His most valuable contribution to the science of society and statecraft is the conception of sovereignty which he was the first clearly to formulate and to develop. Starting with the family as the unit of society, Bodin defines the state as a collection of families united by common interests and common possessions living under the right authority of a sovereign. This sovereign is described as power "supreme and perpetual, absolute, and subject to no law." The kinds of government are three: democracy, aristocracy, and monarchy or despotism, according as the sovereign power reposes in the mass of the people, in a few, or in one; mixed governments there can be none, since in the nature of things the sovereign is one and indivisible. Of the three forms of government Bodin much prefers monarchy, and inasmuch as he endows his ruler with all the gifts of Plato's philosopher-king, he finds it easy to bestow on him the full attributes of sovereignty. Custom, law, the will of the people as expressed through their parliaments and magistrates, are undoubtedly of great importance; but in the last instance the King is subject to no restraint save that of his own conscience. Equally celebrated with his theory of sovereignty is Bodin's analysis of the effect of climate on society and government. In general he finds that the nations of the north are characterized by the

predominance of physical strength, those of the south by mental power, those of the temperate zones by a happy mixture of the two. In the north the dominant force is brute will; in the south, superstition; in the central regions, reason. The ideal commonwealth would embrace the entire world, in which the northern peoples should supply the workers and fighters, the southern peoples the priests, poets, and artists, and the inhabitants of milder climates the legislators, magistrates, and judges. The

Colloquium Heptaplomeres, published only in 1847, is a plea for toleration. Seven men—a Roman Catholic, a Lutheran, a Zwinglian, a Jew, a Mohammedan, an Epicurean, and a Theist—debate on the subject of what is the true religion and arrive at the conclusion that it is best for each man to live in accordance with his own belief, provided his creed be not opposed to public morality and the welfare of the state. In political economy he demonstrated the fact of a general rise in prices in his controversy with the Sieur de Malesroit who, but for Bodin, would be entirely unknown at the present time. He was a critic of the contemporary policy of interfering with the exportation of bullion. His contributions to the theory of public revenues entitle him to an important place in the history of finance. He was opposed to slavery. Despite his breadth of view, Bodin was unable to free himself from the common mediæval superstitions. He devotes an entire book of the *Republio* to an erudite discussion of the influences of the planets on the affairs of men, and in his *Démonomanie* (1580) advocates the burning of wizards and witches. Consult: Baudrillard, *Jean Bodin et son temps* (Paris, 1876); Barthélemy, *Étude sur Jean Bodin* (Paris, 1876); Dunning, *Political Theories from Luther to Montesquieu* (New York, 1905).

BODIO, bö'dyō, LUIGI (1840-). An Italian political economist and statistician. He was born in Milan and studied in Pavia and Pisa. In 1864 he was appointed professor of political economy at the Technical Institute, Leghorn; in 1867 professor in Milan, and in 1868 professor of statistics and commercial geography at the Venice Commercial School. In 1872 he became director of the National Statistical Bureau. He published a considerable number of important statistical works, among which is *Sui documenti statistici del regno d'Italia* (1867). He was editor of the quarterly review entitled *Archivio di Statistica* (1877-82), and became editor of the *Bollettino dell'Istituto Internazionale di Statistica* in 1886.

BODKIN, böd'kin (origin obscure). An instrument used by women of antiquity to fasten up the hair at the back of the head. It was the method commonly adopted by the priests of Cybele as well as by the female characters in Greek tragedy, the bodkin being highly ornamented. Silver bodkins are still worn in a similar way by the peasant girls of Naples. The term "bodkin" is also applied to a sharp-pointed instrument for piercing holes in cloth as well as to a tape needle. It was also at one time a very common name for a dagger.

BOD'LE, or **BOD'DLE**. An ancient copper coin in Scotland, in value the sixth of a penny sterling. The bodle, first issued under Charles II, is said to have been so called from a mint-master of the name of Bothwell. "Not to care a bodle" is a phrase still used.

BODLEIAN (bôd'le-an) **LIBRARY** The great library of the University of Oxford, England. The first library, the foundation of Humphrey, Duke of Gloucester, was destroyed by the fanaticism of Edward VI's Commissioners for the Reform of the University. Sir Thomas Bodley's was a restoration (1602), and his active quest of valuable publications was equalled by his munificence. Formally opened with great ceremony, Nov. 8, 1603, it was the next year granted letters patent by James I, who himself gave it the name of its founder. One of Bodley's first acts was the presentation of a large collection of valuable books, purchased on the Continent at an expense of £10,000. Through his influence and noble example, the library was speedily enriched by numerous other important contributions. Among the earliest subsequent benefactors were the Earl of Pembroke, who presented it with 250 volumes of valuable Greek manuscripts, Sir Thomas Roe, Sir Kenelm Digby, and Archbishop Laud, who made a magnificent donation of 1300 manuscripts in more than 20 different languages. About 8000 volumes of the library of the famous John Selden also went to the Bodleian Library. General Fairfax presented it with many manuscripts, among which was Roger Dodsworth's collection of 160 volumes on English history. The first catalogue of printed books was published by the first librarian, Dr. James (1605). Among some of the important bequests of the nineteenth century were the collections of Richard Gough, on British topography and Saxon and Northern literature, of Edmund Malone, the editor of Shakespeare, and of Francis Douce, also, the sum of £40,000, by the Rev. Robert Mason, the interest to be expended on books. By purchase the library acquired some fine collections of Oriental, Greek, Latin, and Hebrew books and manuscripts. The Bodleian Library is particularly rich in biblical codices, rabbinical literature, and materials for British history. Along with the British Museum, it enjoys the right of receiving a copy of every book appearing in England. There are more than a million bound volumes, 30,000 volumes of manuscripts, besides valuable pictures and relics. The buildings contain also many art treasures, as the Pomfret and Arundel marbles, and the Hope collection of portraits. One of its most interesting paintings is that of Sir Thomas Bodley, full length. There is also a marble bust of him. Members of the university who have taken a degree are admitted to the use of the library, a small addition to the matriculation fees and an annual payment being charged for the privilege. Literary men, properly recommended, are allowed to make extracts from the works in the library, which is usually open from 9 o'clock in the morning to 5 in the afternoon. Connected with the main library is now a circular structure called the Camera Bodleiana, the gift of Dr. Radcliffe, which is kept open from 10 A.M. to 10 P.M. It contains the more common books and is used as a reading room. The tercentenary of the foundation was celebrated with great splendor in the autumn of 1902. Consult Macray, *Annals of the Bodleian Library* (Oxford, 1888); Garnett, *Essays in Librarianship* (London, 1899); Clark, *A Bodleian Guide for Visitors* (Oxford, 1906). See **BODLEY**, **SIR THOMAS**, **LIBRARIES**.

BODLEY, JOHN EDWARD COURTENAY (1853-

) An English historian. He was educated at Balliol College, Oxford, receiving the bachelor's degree in 1877, three years after he had become a barrister of the Inner Temple. He held important official posts, being private secretary to the President of the Local Government Board (1882-85) and secretary to the Royal Commission on Housing of the Working Classes. But he became better known as a writer on French history, being made (1902) a corresponding member of the Académie des Sciences Morales et Politiques. He translated into French (1901-04) his own excellent work on France—vol. 1, *The Revolution and Modern France*, vol. 11, *The Parliamentary System* (1898, 7th ed., 1907), and wrote *L'Anglomanie et les traditions françaises* (1899) and *The Church in France* (1906). He also published an official account of Edward VII's coronation (1903, 2d ed., 1911) and *Cardinal Manning, and other Essays*, mostly on French subjects (1912).

BODLEY, SIR THOMAS (1545-1612). An English scholar and diplomatist, now best known through the Bodleian Library (q.v.). During the reign of Mary his parents were for a time in Geneva, where Thomas studied Greek, Hebrew, and divinity, the last with Calvin. The family returned on the accession of Elizabeth, and the son, entering Magdalen College, Oxford, was duly graduated B.A. in 1563, and was made a probationer fellow of Merton College. The following year he was made actual fellow and in 1566 received M.A. For a while he delivered a Greek lecture, was in 1569 elected proctor, and on one occasion was public orator. Employed by the Queen in diplomatic missions, he was sent to the courts of Denmark, France, and Holland. He was proficient in the continental tongues, and his diplomatic career was so distinguished that he was solicited to become Secretary of State, but the scholarly quiet of the Oxford life appealed to him more strongly, and he returned thither in 1590. Now relieved of public cares, he considered how he might "do the true part of a profitable member of the state," and the restoration of the library seemed to him a rare opportunity. He was fortunate in securing the hearty cooperation of his countrymen. Himself indefatigable, he had an agent go to the Continent and buy largely. He also permanently endowed the library, and in his will he made the university his chief beneficiary. Knighted by James I, he desired that he might be buried in keeping with his knightly rank, and accordingly directed that £666 13s. 4d. be expended for great ceremony. His remains were laid in the chapel of Merton College. There, too, a monument was erected in 1615. Bodley's autobiography up to 1609, with his letters, was published under the title of *Reliquiæ Bodleianæ* (London, 1703). See **BODLEIAN LIBRARY**, **LIBRARIES** with the bibliographies there appended. Consult Sandys, *A History of Classical Scholarship*, vol. 11 (Cambridge, 1903), *Teicentale Bodleianum* (Oxford, 1913).

BODMER, GEORG (1766-1864). A noted Swiss mechanic, born in Zurich. He was apprenticed to a mechanic in Hauptwil and made valuable improvements in wool-spinning machinery in 1805. In 1808 he invented a cannon for firing bombs which exploded upon striking. He continued to manufacture and improve industrial machinery and firearms and in 1824 established large works in Manchester, England.

Subsequently he turned his attention to railway construction in Austria.

BODMER, JOHANN JAKOB (1698-1783). A German-Swiss critic and poet. He was born in Greifensee, became professor of Swiss history and politics in Zurich, and was one of the chief movers in the emancipation of German literature from French classic tradition. He published, with Breitinger, a critical periodical (after the style of Addison's *Spectator*), *Diskurse der Mäler* (1721-23), which attacked the then popular poets with an enthusiastic assertion of Simonides' principle that poetry is word painting, and of the doctrine that its foundation is feeling rather than reason. His æsthetic writings, beginning with *Vom Wunderbaren in der Poesie*, precipitated in 1740 a literary war between him and the powerful Leipzig critic Gottsched (q.v.), who rapidly declined in influence. The viewpoints of the two schools were, however, not so different as one might suppose. The quarrel turned chiefly on the merits of Homer and Milton. As Bodmer and Breitinger championed the cause of beauty and feeling against dogmatism, they won. While Bodmer at first hailed Klopstock (q.v.) as a worthy successor to Milton, he later on became involved in a personal quarrel with him. He totally failed to appreciate the new movement in German literature. He first called attention to the beauties of the Minnesingers and of the Nibelungenlied, translated Milton's *Paradise Lost* (1732) and Homer, and did much to awaken in Germany an interest in English literature. He was not a great poet. His numerous works, to which he continued to add even up to the time of his death, lie in various fields—critical and æsthetic, epic, dramatic, historical, pedagogical, political, and satirical. Consult Breitmaier, *Geschichte der poetischen Theorie und Kritik von den Diskursen der Mäler bis auf Lessing* (2 vols., Frauenfeld, 1888-89); Bächtold, *Geschichte der deutschen Literatur in der Schweiz* (Frauenfeld, 1892); E. Meissner, *Bodmer als Parodist* (Leipzig, 1904).

BOD'MIN (from Cymr., Celt. *bod*, dwelling + *min*, high rock; or possibly *bod-manach*, dwelling of monks). The county town of Cornwall, England, 30½ miles west-northwest of Plymouth (Map: England, B 6). It consists principally of one street a mile long. Its ancient church (St. Petrock's) is one of the largest in Cornwall. It has an ancient grammar school, founded by Queen Elizabeth, a hospital, and the county lunatic asylum. Its chief trade is in cattle, horses, and sheep. Pop., 1891, 5100; 1901, 5400; 1911, 5734. Bodmin was long an important place, having a priory, a cathedral, and 13 churches. Consult *Guide to Bodmin and Neighborhood* (Truro, 1872).

BODONI, bô-dô'nê, GIAMBATTISTA (1740-1813). An Italian type cutter and printer. The son of a printer, he was born in Saluzzo, Piedmont, and was successively a compositor in Rome and the superintendent of the Duke of Parma's private press. He was distinguished rather for his elegance than for his accuracy and is best known by his editions of the *Iliad*, Vergil, and the Lord's Prayer, the last in 155 languages. Worthy of mention, too, is his *Manuale tipografico* (1818). His biography has been written by Bernardi (Saluzzo, 1873).

BOD PA. See TIBET.

BOD'Y, CHARLES WILLIAM EDMUND (1851-

). An Anglo-American theologian. He was born at Clapham, London, and was educated at St. John's College, Cambridge. He was provost and vice chancellor of Trinity University, Toronto, Canada, from 1881 to 1894, when he became professor of Old Testament literature and interpretation of the General Theological Seminary, New York. His principal publication is *The Permanent Value of Genesis* (one of the Paddock Lectures for 1894).

BODY AND MIND. The question of the relation of body to mind, together with the deeper question whether we have a right to separate these two terms and to speak at all of a "relation" between them, is subject-matter for metaphysical inquiry. We refer to the articles DUALISM; EPISTEMOLOGY; MATERIALISM; MONISM; SPIRITUALISM. Here we are concerned simply to discuss the views which have been adopted by psychologists as working hypotheses upon the scientific level, without regard to their ultimate metaphysical validity. Just as physics may postulate, for its own purposes, the existence of a matter which certain philosophical systems repudiate, so may psychology accept a theory of the relation of mind to body which some or all systems of philosophy would pronounce erroneous or inadequate. Every science must assume its data as realities and has a right to its working hypotheses. And some sort of theory of the relation of mind to body has become a necessity for psychology, since Fechner (q.v.) has shown that the presupposition of an exact science of mind is the uniformity of mental response to physical stimulus.

Psychologists are, at the present day, sharply divided into two groups—the one holding a theory of the interaction of mind and body, the other a theory of psychophysical parallelism. The former theory, which has all the weight of common opinion on its side, avers that mental processes are able to act causally upon bodily; that an idea may "make" us act—i.e., condition bodily movements—just as truly as a blow may make us feel pain. The chain of events is made up of two kinds of links—material processes and mental processes; and the links are interchangeable and equally effective. The latter theory maintains that the two series, the material and the mental, are disparate; that they never pass into or interfere with each other. The mental series is conditioned upon the material, runs parallel with it, term for term; but there neither is nor can be any transition from the one to the other. It should be said, emphatically, that there is no necessary connection between the theory of interaction and a metaphysical monism or idealism, and none between parallelism and metaphysical dualism and materialism. Either theory, held as a scientific working hypothesis, is compatible with any one of these ultimate metaphysical beliefs.

The main arguments for interaction are as follows: 1. "The particulars of the distribution of consciousness point to its being effacious" (James). Consciousness can apparently "load the dice" of the brain—i.e., can bring "pressure to bear in favor of those of its performances which make for the most permanent interests of the brain's owner." "Consciousness is only intense when nerve processes are hesitant."

Where indecision is great consciousness is agonizingly intense." This argument squares with the doctrine of biological evolution, in that it gives to mind, which is a highly complex de-

velopment, a survival value in the organism's struggle for existence. 2 A damaged brain may recover and work normally, the parts remaining take on the duties of the parts lost, by the principle of "vicarious function." The restoration is intelligible if consciousness direct it, unintelligible, if the brain machine be subject to no such direction. 3 Pleasures are associated with beneficial stimulation, pains with detriment to the organism. This correlation seems to imply that pleasures and pains exert a direct influence upon the bodily processes. 4 The assumption of the interaction of mind and body assures the universality of the causal connection and the uniformity of natural law throughout the known universe.

To the first argument there is the reply that it offers no proof of the actual interference of consciousness in the struggle for existence. Mind may be a mere concomitant of brain—a concomitant that varies in complexity as its physical substrate varies, and that is thus an index or symptom of brain efficacy, but that is not itself a factor in survival. An animal may surpass its fellows, not because it has a better mind, but because (as its better mind shows) it has a better brain. The presence of an intense consciousness during deliberation and doubt offers no difficulty. (See ACTION.) As for vicarious function, the developed brain is, by hypothesis, an exceedingly complex and plastic structure, not a machine definitely shaped for a few particular ends. Hence there is no need for the intervention of consciousness. The correlation of pleasure with stimuli that further life, and of pain with stimuli that thwart it, is readily explicable as a coincidence due to the continued operation of natural selection (Spencer). An animal that, from the biological point of view, "liked" to be hurt would not exercise any considerable influence upon the further development of its species. Finally, the demand for a universal causality is rather a metaphysical than a scientific postulate.

The arguments in favor of parallelism may be summed up as follows. 1 The hypothesis is a necessity for scientific psychology. If our psychological experiments, in which we submit the mind to various forms of physical stimulation and observe the results, were liable to interruption by the reaction of mind itself upon the stimuli employed, there could be no hope of erecting "laws" of mind, of discovering mental "uniformities." Our most laborious and careful researches might be upset at any moment by the interjection of some mental influence. The fact that laws and uniformities have been established indicates that the mental is conditioned, unequivocally, by the physical, and that there is no reciprocal conditioning. 2 The categories of mind and body are most diverse of all that are recognized by science. They are entirely heterogeneous. But it is a rule of logic that one may not argue from category to category, reasoning is valid only within the limits of a single "kind" or "genus." Hence we may not interpolate mental links in the chain of physical causation, and vice versa. 3 Reflex and secondary reflex movements show that the organism can act "teleologically," i.e., as if with set purpose and with a view to a determinate end, without the aid of consciousness. 4 The law of the conservation of energy requires that motion produce and be produced by motion, it forbids any arbitrary increase of the energy of

the organism, such as must follow from the direct action of mind upon brain cell.

The first of these arguments is difficult to meet. It rests upon a basis of positive fact, whatever our theoretical belief, we can but grant the utility of the parallelistic principle in the practice of experimental psychology. We might, however, urge that the heuristic value of a working hypothesis is no evidence that the hypothesis will endure. A proposition that appears self-evident at one stage of the history of a science may be utterly overthrown by later discovery. It may be, then, that as our experimental methods grow in refinement, and we attack the higher and more complex processes of mind, we shall gain evidence of the very mental action which now seems to be precluded by the results of experiment. The second argument is less strong. No formal considerations can limit the province of cause and effect: experience must decide in each case, irrespective of homogeneity or heterogeneity of the terms. The purposiveness of the reflex movements "proves only that the same effect can proceed from different combinations of conditions" (Stumpf). Moreover, it is probable that these movements are, one and all, degenerate impulsive actions (See ACTION), so that their teleology may, after all, be consciously conditioned. Lastly, there is no good reason why we should not rank "mental energy" alongside of chemical, thermal, electrical, etc., energy, and assume that it, like these, has its precise mechanical equivalent.

We shall incline to one side of the other, then, as our interests and experience prompt. The descriptive psychologist, keenly alive to the manifestations of mental life about him and influenced by the traditions of psychological thought, will tend toward an acceptance of interaction, the experimental psychologist, revolutionary in temperament and dominated by the methods of the laboratory, will tend toward a parallelistic theory. The impossibility of present decision may mean that we have not as yet sufficient facts at our disposal for a solution of the problem, or it may mean that the problem is now wrongly formulated, and will be transcended by a true philosophy. In either case we must put our trust in time and further work.

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BODY COLOR. A pigment possessing substance, consistency, and covering power, which contributes substance to other pigments. The term is applied particularly to the solid white known as Chinese White, used in water colors, which by rendering them opaque distinguishes them from the transparent and fluid washes which mark the water-color method pure and simple.

BODY ISLAND. See **BODIE ISLAND**.
BODY SNATCHING. The common law of-

fense of unlawfully taking and carrying away a dead human body. When the body is taken from a grave, the offense is commonly called *body lifting*. The taking is ordinarily for the purpose of dissecting the body or selling it for dissection or of secreting and holding it for ransom. By statute in many of the United States a person has the right to direct the manner in which his body shall be disposed of after his death, unless he is a convicted felon. In the latter case his body may be turned over to medical authorities for dissection. Statutes frequently provide also for the exhumation and dissection of buried bodies, under the direction of proper officers, for the purpose of discovering the cause of death. But the removal of a dead human body after burial, or while awaiting burial, if made without authority of law, with intent to sell or use it for dissection, is in nearly every jurisdiction a statutory or a common-law offense, punishable by imprisonment or a fine, or by both. See CORPSE, and the authorities referred to under CRIMINAL LAW.

BOECE, bois, or **BOËTHIUS**, HECTOR (1465–1536). A distinguished Scottish historian. He was born in Dundee, and belonged to the family of Bois or Boys, modern Boice or Boyce. He was educated in Dundee, and studied at the University of Paris, where he took the degree of B.D. He was appointed professor of philosophy at the Collège Montaigu, and acquired there the friendship of Erasmus, who has praised him in his writings. He left Paris reluctantly to preside over the new University of Aberdeen, the prosperity of which he greatly promoted. He also became canon of Aberdeen and rector of Tyrie. In 1522 he published his lives of the bishops of Mortlach and Aberdeen. His fame rests chiefly on his *History of Scotland*, published 1527, for which he received the degree of D.D. from the university and a royal pension. This work contains a large amount of fiction, but is worthy of the commendation it has received on the score of style. It is supposed that Boece died in 1536, for on November 22 of that year the King presented the rectory of Tyrie, vacant by the death of Mr. Hector Boiss, to John Garden. Consult: Irving, *Lives of Scottish Writers* (Edinburgh, 1839); and Burton, *History of Scotland* (Edinburgh, 1873).

BOECKH, bek, PHILIPP AUGUST (1785–1867). A German classical scholar. He was born in Karlsruhe, Nov. 24, 1785, and was enrolled in the University of Halle in 1803 as a student of theology, philosophy, and philology, but the lectures of F. A. Wolf (q.v.) induced him to devote himself exclusively to philology; the influence of Schleiermacher (q.v.) led him to the special study of Plato. In 1809 he became professor at Heidelberg and in 1811 was called to the newly established University of Berlin, which owed much of its early fame to him, in company with Hegel and Schleiermacher. Boeckh lectured in Berlin with great success for 56 years to a total of many thousand students. The range of his studies was very wide, and he was the first to develop philology on a philosophic basis. He conceived of that science as an organically constructed whole, which aims at nothing short of a complete intellectual reproduction of antiquity. His lectures therefore included both formal and historical grammar, exegesis, archaeology, history of ancient literature, philosophy, politics, religion, and society. (Consult Freund-Deiter, *Wie studirt man klas-*

sische Philologie, Stuttgart, 1903). Boeckh's concept of philology excited much opposition at first, but gradually won adherents, and unquestionably gave a great stimulus to classical scholarship; at the present time, after many of the subjects which Boeckh regarded as subdivisions of philology have been exalted to the position of independent sciences, there are significant signs of a return to his general view of the unity of philology. His earliest publication, dedicated to Wolf, was *Commentatio in Platonis qui vulgo fertur Minoem* (1806); in his *Græcæ Tragicæ Principum Æschyli, Sophoclis, Euripidis, Num Ea Quæ Supersunt Genuina Sunt*, etc., published in 1808, he discussed the possible revisions due to repeated productions and the interpolations of actors in the extant tragedies. He also produced some monographs on Plato while professor at Heidelberg.

His great works are the following: an edition of Pindar in 4 vols. (1811–22), the completion of which he entrusted to his friend G. L. Dissen (q.v.), professor in Göttingen. This marked an epoch in Pindaric studies by its criticism of the text and the scholia, and especially by Boeckh's investigations of the metre. The introductory essay on the criticism of Pindar is still of great value. His work *Die Staatshaltung der Athener*, 'The Public Economy of Athens' (2 vols., 1817; 3d ed., by Fränkel, 1886) applied the methods of his master, Wolf, and of his older contemporary, Niebuhr, to questions of the commercial and state economy of the Athenians in a masterly manner; by it Boeckh established the science of public antiquities, in which he was followed by K. F. Hermann, G. F. Schoemann, and M. H. B. Meier (q.v.); and the work remains a permanent monument of thorough research, analysis, and vast learning. It gave a full and systematic statement of the economic side of the Athenian constitution in its actual working; it contained an *Appendix of Inscriptions on the Athenian Navy*. The work was translated into English in 1828 by Sir George Cornwall Lewis. In his investigations Boeckh had been led to a careful study of Attic inscriptions; he was practically the founder of the scientific study of inscriptions. He now planned a comprehensive collection of Greek inscriptions, the cost of which was undertaken by the Berlin Academy. With Boeckh were associated Ph. Buttmann, Schleiermacher, Immanuel Bekker (q.v.), and later many others; the result of their work was the *Corpus Inscriptionum Græcarum* (4 vols., 1825–62). Among his other important works are *Philolaos' des Pythagoreers Lehre* (1819); *Metrolologische Untersuchungen über Gewicht, Münzfüsse und Masse des Altertums* (1838); *Urkunden über das Seewesen des attischen Staates* (1840); *Sophokles Antigone* (2d ed., 1884); *Encyclopædie und Methodologie der philologischen Wissenschaften*, never published by himself, but edited from his lectures on the subject by Bratuschek (1877; 2d ed., by Klusmann, 1886). This is still the most important work in its field. Boeckh won a great name also for investigations in ancient chronology, by his *Zur Geschichte der Mondsystem der Hellenen* (1855); *Epigraphisch-chronologische Studien* (1856), etc. His *Opuscula* fill 7 vols. (1858–74). He died in Berlin, Aug. 3, 1867. Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

BOËDROMIA. See BOËDROMOS.

BOËDROMIOS (Help-giver). An epithet

of Apollo, the origin of which is assigned to various events of Greek history (consult Plutarch, *Theseus*, 27). From this epithet was derived the name of the third Attic month, Boedromion, corresponding to portions of September and October, on the 7th day of which the festival Boedromia was celebrated in honor of Apollo.

BOEHLE, bē'le, ERNST (1880-) A German composer. He was born in Munich, Dec. 27, 1880, and received his musical education under Ludwig Thuille (composition) and Heinrich Schwartz (piano). Since 1907 he has been conductor of the concerts of the *Vollsymphonie* in Munich. As a composer he immediately attracted attention with large orchestral works that show not only excellent workmanship but inventive power of an unusual order. His works are *Odysseus' Ausfahrt und Schiffbruch*, *Die Insel der Kulte*, *Die Klage des Nausiklaos*, *Odysseus' Heimkehr*, *Troisma*, *Eine tragische Overtüre*, and vocal works with orchestra *Stille der Nacht*, *Landung*.

BOEHLER, bē'ler, PETER (1712-75). A Moravian Bishop. He was born at Frankfurt-on-the-Main, Germany, studied at Jena and in 1737 was ordained as a Moravian minister by Count Zinzendorf (qv). On his way to America, where he had been sent as a missionary to Carolina and Georgia, he stopped in England and there became acquainted with John and Charles Wesley, over whom he had a powerful influence. He worked among the negroes in Georgia and among the Germans in South Carolina, some of whom he ultimately transferred to Bethlehem, Pa. For a year Boehler labored as missionary to the Indians. He then went to Europe and returned with a large number of Moravian colonists. This addition to the growing community at Bethlehem caused the founding of Nazareth, near the original town. In 1742 Boehler was appointed Bishop of the Moravian churches in America, England, Ireland, and Wales. While on a parochial visit to his new charge he died in London. Consult T. P. Lockwood, *The Memorials of the Life of Peter Boehler* (London, 1868).

BOEHM, bēm, HENRY (1775-1875). An American Methodist minister. He was born in Lancaster Co., Pa., and became a preacher in 1800. He was an intimate friend and associate of Bishop Asbury and greatly contributed to the extension of Methodism, particularly among the German-speaking people of Pennsylvania. Consult his *Reminiscences of Sixty-Four Years in the Ministry* (1865).

BOEHM, SIR JOSEPH EDGAR (1834-90). An English sculptor. He was born in Vienna, the son of the director of the Imperial Mint, and from his father received his earliest instruction. In 1840-51 he studied in England, chiefly the Elgin marbles and other sculptures in the British Museum, and afterwards in Italy, Paris, and Vienna. He was then active as a medalist in Vienna, but, encouraged by the success of his works exhibited in the Royal Academy in 1862, he removed to London and soon became the most representative sculptor of the Victorian period. In 1881 he was named sculptor in ordinary to the Queen, and in the following year was elected to the Royal Academy. Among his best-known productions are the colossal bronze statue of Queen Victoria at Windsor, and statues of John Bunyan at Bedford, of Lord John Russell in Westminster Hall, London, of the Duke of Wel-

lington at Hyde Park Corner, and of Thomas Carlyle on the Thames Embankment, and the fine recumbent figure of Dean Wellesley in Westminster Abbey. Boehm's art represents the transition from the cold classicism then prevalent in England to the more realistic productions of the present day. Without being work of the highest rank, it is often well characterized and able.

BOEHMERIA (after the German naturalist Bohmer). A genus of plants of the family Urticaceae. The fibres of a number of species are used for making ropes, twine, nets, sewing thread, and cloth, and some of them appear likely to acquire much economical and commercial importance. The commercially important species now known are *Boehmeria nivea* and *Boehmeria tenacissima*, also known as *Boehmeria undulata*, the latter being often considered as merely a variety of the former differing mainly in having green leaves, instead of those which are white beneath. *Boehmeria nivea* grows in temperate and subtropical regions, while the variety flourishes in subtropical and tropical countries. It yields a great part of the fibre employed in China in the manufacture of the beautiful fabric known as China-grass cloth (qv). It is a perennial herbaceous plant, with broad ovate leaves, which are white and downy beneath, and is of the general habit though destitute of the stinging powers of the nettles. It is carefully cultivated by the Chinese, by whom it is called *tekou ma*. It is propagated either by seeds or by parting the roots. It loves shade and moisture. Three crops are obtained in the season, new shoots springing up after it has been cut. Great attention is bestowed upon the preparation of the fibre. This is extracted by hand stripping, by boiling the stalks in water, or some chemical solution, or by machinery. Machine methods have so far not met with unqualified success. On the other hand, the first-named two ways of extracting the fibre are more or less intricate and involve a large amount of hand labor. As a consequence, the bulk of the fibre is produced in China and India, where cheap labor is plentiful. Some writers claim to *Boehmeria nivea* properly belongs the name China grass, while ramie or ihea should be retained for the plant which Dr Roxburgh strongly recommended to attention about the beginning of the nineteenth century, now known as *Boehmeria tenacissima* (see RAMIE). It is now believed that most of the commercial fibre comes from *Boehmeria nivea*. An allied species, *Vilbunnea integrifolia*, is common in Nepal, Sikkim, and other parts of the Himalaya, to an elevation of 3000 feet above the sea. It is not cultivated, but often overruns abandoned fields. It grows to a height of 6 or 8 feet and varies from the thickness of a quill to that of the thumb. The plant is cut down for use when the seed is formed, the bark is then peeled off, dried in the sun for a few days, boiled with wood ashes for four or five hours, and beaten with a mallet to separate the fibres, which are called *poash* or *poce*, and also *kenka* or *yenka*. When properly prepared, the fibre is quite equal to the best European flax. The fibres of a number of coarser species are employed in different parts of the East Indies for making ropes. *Macoutia puya*, a plant belonging to the same family, is also an important source of fibre in the East Indies. The cultivation of *Boehmeria nivea* has been introduced into the southern part of the United States

and in California, and with the invention of satisfactory methods of decortication and degumming it will doubtless prove an important industry. *Boehmeria cylindrica* is indigenous to the United States, occurring as an annual in waste places from Canada to Florida, and westward. Consult Royle, *Fibrous Plants of India* (London, 1865); Dodge, *Descriptive Catalogue of Useful Fibre Plants* (Washington, 1897). See Plate of FIBRE PLANTS.

BOEHMERT, bö'mért, KARL VIKTOR (1829-). A German writer on political economy. He was born in Quesitz, Saxony, and studied in Leipzig. In 1857-60 he edited the *Bremer Handelsblatt*, from 1886 to 1875 he was professor of political economy at the University of Zürich, and from 1875 to 1895 director of the bureau of statistics of Saxony. He was appointed in 1875 professor of political economy and statistics at the Technological Institute in Dresden, retiring in 1903. He sought steadfastly to promote free trade and to liberate German industry from its medieval restrictions. He wrote *Briefe zweier Handwerker* (1854); *Freiheit der Arbeit* (1858); *Der Sozialismus und die Arbeiterfrage* (1872); *Die Gewinnbeteiligung der Arbeitnehmer in Deutschland, Oesterreich und der Schweiz* (1902; French trans., 1908); *Das Alkoholverbot* (1904 and 1909).

BOEHM VON BAWERK, bëm fön ba'vërk, EUGEN (1851-). An Austrian political economist. He was born in Brünn, Moravia, Feb. 12, 1851, was educated at the University of Vienna, and from 1872 to 1879 continued his study of political economy in Heidelberg, Leipzig, and Jena, under Knies, Roscher, and Hildebrand. He held for a short time a place in the Austrian Ministry of Finance, lectured in 1880 at the University of Vienna, but was called thence to the University of Innsbruck, where he remained till 1889. He then entered once more the government service, in the department of finance, and was Minister of Finance from June 13 to Oct. 2, 1895. He was then appointed professor in the University of Vienna and became president of one of the superior courts of administration. In 1897-98 he was again Minister of Finance; in 1899 he was called to the House of Peers, and January, 1900, until October, 1904, he was in charge of the Ministry of Finance. Boehm von Bawerk is one of the leading economists of the so-called Austrian school. With Menger, Wieser, Sax, and other economists he worked out a system of value based upon the final utility concept. His principal contribution, however, is to the theory of capital and interest. In his *Geschichte und Kritik der Kapitalismus Theorien*, (1884; trans. by William Smart in 1890 under the title *Capital and Interest*) Boehm von Bawerk subjects all earlier theories to a searching criticism and finds them essentially defective. In his *Positive Theorie des Kapitals* (1889; enlarged ed., 1909-12, trans. by William Smart in 1891), Prof. Boehm von Bawerk contends that interest arises from the undervaluation of future goods, to which class all instruments of production belong. This undervaluation is due to (1) inferior provision for present wants; (2) the technical superiority of present goods; and (3) men's incapacity to make full allowance for future needs. This theory, in somewhat modified form, has found wide acceptance among American economists. Boehm von Bawerk also wrote *Zum Abschluss des Marxschen Systems* (1896), trans. by Alice M. MacDonald under

the title *Karl Marx and the Close of his System* (1898), and *Einige strittige Fragen der Kapitalstheorie* (Vienna, 1900).

BOECKELMANN, bö'kel-män, BERNARDUS (1838-). A Dutch pianist. He was born in Utrecht, June 9, 1838, and received his first musical education from his father. From 1857 to 1860 he was a pupil of the Leipzig Conservatory, where he studied under Richter, Hauptmann, and Moscheles. In 1862 he became a teacher in Stern's Conservatory in Berlin, but at the same time he continued his studies under Bulow, Kiel, and Weitzmann. In 1864 he made a tour of Mexico and also visited the United States. He settled permanently in New York in 1866 and soon was recognized as one of the foremost teachers of America. His analytical edition of selected fugues from Bach's Well-Tempered Clavichord attracted considerable attention. In order to make the structure and development of these fugues clear to amateurs he printed the themes, counterthemes, etc., in different colors. His Trio Club, which he directed from 1867 to 1884, was an important factor in the musical life of New York, and greatly aided and advanced the appreciation of chamber music.

BOËLLMANN, bö'el'män', LÉON (1862-97). French organist and composer. He was born at Ensisheim (Alsace), Sept. 25, 1862. He was educated at Niedermeyer's Music School in Paris, and after graduation he continued his studies as a private pupil of E. Gigout. In a very short time he won a reputation as one of the foremost organists, and from 1880 to his early death, Oct. 11, 1897, he presided at the magnificent organ of St. Vincent de Paul in Paris. His compositions, which show remarkable talent, are a Symphony in F, Symphonic Variations for 'cello and orchestra, a piano quartet, a piano trio, a sonata for 'cello, *Suite Gothique* for organ, *Fantassie dialoguée* for organ and orchestra, *Rhapsodie carnavalesque* for piano (four hands), and a collection of 100 organ pieces published under the title *Heures mystiques*. Consult P. Locard, *Léon Boëllmann* (Paris, 1901); Locard, *Biographie de Léon Boëllmann* (Strassburg, 1903).

BOËO. See CAPE BOËO.

BCEOTARCH, BCEOTARCHES. See BCEOTIA.

BCEOTIA (Gk. *Bœotia*, *Boiōtia*). In ancient geography, next to Attica, the most important political division of central Greece, bounded on the north by Locris and the Eubœan Gulf, on the east by the narrow strait of the Euripus, on the south by Attica, Megaris, and the Corinthian Gulf, and on the west by Phocis. Bœotia had a surface estimated at 1000 to 1100 square miles. The plains inclosed on the south by Mounts Cithæron and Parnes, on the west by Mount Helicon, on the north by the slopes of Mount Parnassus and the Opuntian Mountains, fall naturally into two divisions—the basin of Lake Copais, now called Topolias, and that of the Asopus, together with the coast district on the Corinthian Gulf. The principal stream was anciently called the Cephissus. It entered the country from Phocis at Cheronea; and in the spring, when it was swollen by innumerable torrents, converted the Copaic plain into a shallow lake. There were underground channels for the outlet of the waters that congregated in this plain, but only four were active at the time the French engineers, in 1833, began extensive drainage works to recover this valuable

region to agriculture and remove the malarial marshes. The successful draining of the bed of the lake showed that similar works had been carried out by the Minyæ of Orchomenus (q.v.) in the Mycenaean period, a large dike ran along the north shore, collecting the waters of the Cephissus and the Melas, and emptying them through a great natural subterranean passage. Another dike kept back the waters from the south shore and brought them to the same outlet. A dike near the centre seems to have been connected with a system of irrigation. Forts secured the outlets against hostile attack. With the fall of the Mycenaean Kingdom at Orchomenus, the works seem to have been neglected, and a change in the sea level seems to have rendered the outlets useless, so that the became again flooded. An attempt to cut the old passages and open new ones was made during the reign of Alexander the Great, but there are traces of similar attempts in the time of the Romans. Boetia in antiquity was a productive region, abounding in fruits, and well fitted for pastoral pursuits, potters' clay, and iron were found there, and it was also celebrated for flute-making. The inhabitants in the legendary age were the Minyæ of Orchomenus and the Cadmeians, both Greek races and hostile to each other. Later the country was occupied by the Boeotians, an Aëolic people, who were more numerous than the Thespians. The Boeotians were hostile to the Athenians. From 457 to 447 all Boetia, except Thebes, was subject to Athens, the country regained its freedom, however, by the battle of Plataea (q.v.). In the Peloponnesian War the Boeotians sided with Sparta. In 424 they defeated the Athenians decisively at Delium. The Boeotians excelled as cultivators of the soil and were gallant soldiers, both on foot and on horseback, but they were rude and unsocial, and took little part in the gradual refinement of manners and intellectual development of the rest of Greece, so that their name became proverbial for illiterate dullness. This was usually ascribed to their thick damp atmosphere. Yet there were not wanting among them eminent generals, as Epaminondas and Pelopidas, and poets and historians, as Hesiod, Pindar, Corinna, and Plutarch. The greater cities, of which the number was about 14, Thebes, Haliartus, Thespia, etc., with their territories, formed the Boeotian League. At the head of this were seven Boeotarchs, who held office for one year, commanded the army of the league and conducted its diplomacy, though the final decision in matters of policy seems to have rested with the four councils, concerning whose composition we are not informed. The internal history of Boetia is largely concerned with the efforts of Thebes to maintain her leadership through this league against the efforts of Thespia, Orchomenus, and other cities for autonomy. The power of Thebes and the league was at its height in the years succeeding the battle of Leuctra, 371 B.C., when Epaminondas (q.v.) placed Thebes at the head of Greece. After the battle of Chæronea, in which Philip established the Macedonian throne on the ruins of Grecian liberty, the political importance of Boetia declined so rapidly that about 30 B.C. only two cities, Tanagra and Thespia, had any prominence. Boetia now forms one of the nomes of the Kingdom of Greece. The capital is Livadia. Its area is about 1550 square miles, and

its population in 1907 was 65,816. Consult W. M. Leake, *Travels in Northern Greece* (London, 1835); W. Rhys Roberts, *The Ancient Boeotians* (Cambridge, 1895), for the works in Lake Copais; E. Curtius, *Die Deichbauten der Minyer* (Berlin, 1892), and for topography, Ulrichs, *Reisen und Forschungen in Griechenland* (Bremen, 1840); Bonne, "The Boeotian Federal Constitution," in *Classical Philology*, vol. v (Chicago, 1910).

BOER, böm (Dutch *boer*, farmer, Ger. *Bauer*, peasant, Eng. *boor*, husbandman, rustic). The name given to the Dutch inhabitants of South Africa who are descended from the original settlers of Cape Colony. Separated for centuries from the rest of the world, these people, in their rude pioneer life, preserved their belief in the stern tenets of early Calvinism, a belief which colored their whole life. When, in 1814, Cape Colony was ceded by Holland to England, the English administrators failed entirely to understand the people with whom they had to deal, and they increased the hostility which the Dutch naturally felt for the English by their drastic legislation against practices which were a part of the religion as well as the life of these simple people, possessing many of the faults as well as many of the virtues of a primitive state of society. As a result, there was a series of *treks* or emigrations, by which the more determined Boers sought to free themselves from British control. The first considerable movement of this kind was the "great trek" of 1836. The Boers at first attempted to establish themselves in Natal, but they came into collision with the native Kaffirs, who were under British protection, and when Natal became an English colony they removed beyond the Drakenberg Mountains, taking possession of an extensive region on both sides of the Vaal, the principal affluent of the Orange River. Here they founded two states, the Transvaal or South African Republic, in the north, and the Orange Free State in the south. The Boers believed in their right to enslave the natives, and the abolition of slavery under English rule was one of the grievances that led to the *trek*. This attitude of the Boers won them the hatred of the native peoples. The Sand River Convention of 1852 between commissioners for the Cape government and for the Boers gave autonomy to the Transvaal, with a reservation against the practice of slavery. The convention of Bloemfontein two years later brought the Orange Free State into being. The Boers continued to be, for the most part, farmers clinging with the utmost conservatism to their antiquated religious ideas and their primitive mode of life. Their tenacity of purpose and stubborn independence in opposition to the British power in South Africa, although it won respect for the rugged virtues of their character, brought into being a constant state of friction between Boer and British settlers which resulted in the absorption of all South Africa in the British Empire. For the later and more detailed history of the Boers, see **UNION OF SOUTH AFRICA**. Consult also Theal, *History of the Boers in South Africa* (London, 1888); David Livingstone, *The Transvaal Boers* (Edinburgh, 1881); F. W. Chesson, *The Dutch Boers and Slavery in the Transvaal* (London, 1869); Lucas, *The History of South Africa to the Jameson Raid* (Oxford, 1899); Cana, *South Africa from the Great Trek to the Union* (1909).

BOERHAAVE, böör'hä've, HERMANN (1668-

1738). A Dutch physician, born at Voorhout, near Leyden. In 1682 he went to Leyden to become a clergyman, and studied Greek, Latin, Hebrew, Chaldee, ecclesiastical and secular history, and mathematics. In 1689 he was made doctor of philosophy and in 1690 began the study of medicine. Though mainly self-educated in medicine—as in chemistry and botany—he gained his doctor's degree at Harderwyck, 1693, and returned to Leyden, where, in 1701, he was appointed lecturer on the theory of medicine. In his inaugural lecture he recommended to the students the ancient method of Hippocrates in medicine; but in 1703 his views had widened, and he elaborated various mechanical and chemical hypotheses to explain the diseases of the body, especially in the case of the fluids. In 1709 he was elected professor of medicine and botany in the place of Hottot. About this time he published the two works on which his great fame chiefly rests: *Institutiones Medicæ in Usus Annuæ Exercitationis Domesticæ* (1708), and *Aphorismi de Cognoscendis et Curandis Morbis, in Usum Doctrinæ Medicæ* (1709) which were translated into various European languages and into Arabic. In the first work—a model of comprehensive and methodical learning—he gives a complete outline of his system, including a history of the art of medicine, an account of the preliminary knowledge necessary to a physician, and a description of the parts and functions of the body, the signs of health and disease, etc.; in the second he gives a classification of diseases, with their causes, modes of treatment, etc. Boerhaave also rendered important services to botany. Among his best lectures are those delivered on his resignation of the office of rector of the university, *De Comparando Certo in Physicis* (Leyden, 1714), and *De Honore Medici, Scrivite* (1736). To combine practice with theory, he caused a hospital to be opened, where he gave clinical instruction to his pupils. Though so industrious in his own profession, he undertook, in 1718, after Lemort's death, the professorship of chemistry and published in 1724 his *Elementa Chemicæ*, a work which did much to render this science clear and intelligible, and one that will always occupy a high place in the history of chemistry. His fame had meanwhile rapidly increased. Patients from all parts of Europe came to consult him. Peter the Great of Russia visited him; and it is even said that a Chinese mandarin sent him a letter, addressed "Boerhaave, celebrated physician, Europe." Consult Burton, *Account of the Life and Writings of Boerhaave* (London, 1743), and Johnson, *Life of Boerhaave* (London, 1834).

ROESWILLWALD, bës'vil-vält, EMILE (1815-96). A French architect, born in Strassburg. He felt very early the reaction in favor of a return to the old French architecture and joined Viollet-le-Duc and Lassus in their endeavor to restore the mediæval styles. So strong was the prejudice against anything Gothic that his drawings were refused at the Salon of 1840, but his talent was too evident to be long ignored. Three years afterward he became one of the commission for the care of historic monuments, and as inspector general of the commission was in charge of the excavations in Algeria and Tunis. His principal works are the restoration of the cathedral of Lugon and, with Duban and Lassus, the restoration of the Sainte Chapelle at Paris. He was, in company with Viollet-le-Duc

and Lassus, one of the inspectors of Notre Dame. Among his designs are those for a number of churches and public buildings in France and Spain. He was preëminently a scholar and archeologist, and received honors from various French and foreign societies.

BOËTHIUS, bô-ë'thi-üs, or **BOËTIUS**, bô-ë'shi-üs. See BOSCE.

BOËTHIUS, or (more correctly) **BOËTIUS**, ANICIUS MANLIUS TORQUATUS SEVERINUS (480-524). A Roman statesman and philosopher. The family to which he belonged had been distinguished for both wealth and dignity for two centuries. His father, who held the office of consul, died when Anicius was still a boy, and consequently the latter was brought up under the care of Symmachus (q.v.), whose daughter, Rusticana, became his wife. It is known that he studied philosophy, mathematics, and poetry, translated and elucidated with laborious care the writings of Aristotle, and of the old mathematicians, Euclid, Archimedes, Ptolemy, and others; but the story of his 18 years' stay in Athens is entirely unhistorical. Boëthius soon attracted notice; he became a patrician before the usual age, a consul in 510, and also *princeps senatus*. Having, moreover, gained the esteem and the confidence of Theodoric (q.v.), King of the Ostrogoths, who had fixed the seat of his government at Rome in the year 500, he was appointed by that monarch *magistor officiorum* in his court. His influence was invariably exercised for the good of Italy, and his countrymen owed it to him that the Gothic rule was so little oppressive. His good fortune culminated in the prosperity of his two sons, who were made consuls in 522. But his bold uprightness of conduct, springing from what seem to have been the essential characteristics of the man—viz., strong faith in the truth of his philosophic ethics, and courage to regulate his official conduct by them—at last brought down upon his head the unscrupulous vengeance of those whom he had checked in their oppressions and provoked by his virtues. He was accused of treasonable designs against Theodoric; and the King, having become despondent and distrustful in his old age, was induced to listen to the charges. Boëthius was stripped of his dignities, his property was confiscated, and, after imprisonment at Pavia, he was executed about 524, according to one account under circumstances of horrible cruelty. During his imprisonment Boëthius wrote his famous *De Consolatione Philosophiæ*, divided into five books, and composed in the form of a dialogue, partly in prose, partly in verse, in which Boëthius himself holds a conversation with Philosophy, who shows him the mutability of all earthly fortune and the insecurity of everything save virtue. The *Consolatio* is piously theistic in its language, but affords no indication that Boëthius was a Christian; and if the doctrinal treatises ascribed to him are, as the acutest criticism maintains, not genuine, we must class him in religion rather with Marcus Aurelius than with his alleged friend St. Benedict. He was the last Roman writer of any mark who understood the Greek language and literature. He translated into Latin parts of Aristotle's writings and wrote commentaries on some of them; from these works the Middle Ages largely derived their knowledge of Aristotle. During the Middle Ages he was regarded with profound reverence, as the

Augustine of philosophy, but on the introduction of the Aristotelian metaphysics in the thirteenth century his reputation gradually sank. The first edition of Boethius' entire works appeared at Venice, 1491-92, the standard edition of the entire works is to be found in Migne, *Patrologia Latina*, vols. lxxii-lxiv (Paris, 1860). The oldest edition of the *Consolatio* is that published at Nuremberg, 1473, but many manuscript translations into various languages had appeared long before the invention of printing. Among these may be mentioned that by King Alfred into Anglo-Saxon and by Chaucer and Queen Elizabeth into English. The best edition is by Peiper, Leipzig (Teubner), 1873, a new translation was published by James (London, 1897). Consult also Stewart, *Boethius An Essay* (Edinburgh, 1891). The most interesting question in connection with Boethius' mathematical works relates to his knowledge of Hindu numerals, characters evidently derived from them appearing on the apices of small cones used on the abacus. A discussion of this question may be found in Cantor's *Geschichte der Mathematik*. Consult also A. Hildebrand, *Boetius und seine Stellung zum Christenthum* (Regensburg, 1885), Teuffel, *Geschichte der römischen Literatur*, vol. 3, sec. 478 (6th ed., Leipzig, 1913).

BOETHIUS, bō-ē-thūs (Gk. Βοέθιος). A native of Chalcedon, a worker in silver and a sculptor. According to Pliny (*N. H.* xiv, 84), he was better in working in silver than in sculpture, and was especially successful in portraying children. Pausanias (*v.* 17, 4) speaks of a seated gilded (bronze?) statue of a boy at Olympia, and Pliny (*loc. cit.*) mentions a boy struggling with a goose. It is probable that the boy and the goose, which exist in several copies (*John Bell Stud.*, vi, p. 7), is a work of Boethius, and that these various replicas go back to the original cited by Pliny. His date has been recently settled by a discovery in Rhodes (*Jahrb. d. Inst.*, 1904, p. 212) as being in the first half of the second century B.C.

BOETIUS, See BOECE, BOETIUS.

BOETTI, bō-ē-tē, GIOVANNI BATTISTA (1743-98). An Italian adventurer whose place of birth is unknown. After a series of remarkable adventures Boetti, under the title of an emissary of Mohammed, put himself at the head of a small army and within a year subdued Kurdistan. He afterward engaged in war with the Russians, by whom he was finally taken prisoner. He died in captivity on the island of Solovelsk, in the White Sea.

BOETTICHER, bō-tīk-ēr, P. A. DE LAGARDE. See LAGARDE.

BOEUF BAYOU, bōf bā-yō. An overflow stream in Arkansas and Louisiana, fed in time of inundation by the Mississippi. It unites with the Ouachita or Washita River and at high water affords 100 miles of steamboat navigation.

BOEYER, ADOLPH VON. See VON BOEYER, ADOLPH.

BOG (Gael. *bogán*, quagmire, *fi* and Gael. *bog*, soft, moist). Wet land covered with moss and often underlain by it to a variable depth. Owing to the spongy character of the material, bogs are often saturated with water and converted into a kind of quagmire. The term "peat bog" is especially applied to those swamps or bogs which are underlain by an accumulation of peat, a vegetable gathering caused by the growth and decay of sphagnum, rushes, and various aquatic plants. Peat bogs are especially abundant in

the north temperate regions, much of Ireland and portions of England, as well as northern Germany, Nova Scotia, and Canada being covered by them. Various archaeological objects and the bones of many extinct animals like the mastodon and mammoth are found in such bogs, since any organic material decays very slowly in these surroundings.

Bogs often originate by a process of lake filling, ponds or even estuaries being partly filled by the inwash of sediment and partly by the spread of bog mosses from the shore into the ever-shallowing water. As soon as one layer of bog moss decays another growth springs up. The term "climbing bogs" is applied to those formed on hillsides, the supply of moisture being kept up by mountain springs. In many regions the peat is dug and utilized for fuel. When properly treated, bogs also yield arable land of much value. The reclamation of bogs for farming purposes involves the proper drainage of the area, and the plowing up of the soil in order to aerate it and bring about the necessary oxidation processes. In some cases clay is plowed in, although this requires time and expense. Oats are usually the best first crops. Once reclaimed, the soil is exceptionally fertile, containing an inexhaustible supply of humus, and is specially adapted for the growth of vegetables like celery, onions, and the various root crops.

The bog oak is a tree favoring peat bogs, the wood of the tree is black and dense and is used for carvings. The word "bog" is of Irish origin, being from a Gaelic root that signifies "a hobbling, quaking notion." See BENT GRASS, WASTE LANDS, PEAT, SPHAGNUM.

BOGAARD, MARTIN VAN DEN. See DESJARDINS, MARTIN VAN DEN BOGAARD.

BOGAERS, bō-gā-ers, ADRIAAN (1795-1870). A Dutch poet, born at The Hague and educated in law at Leyden. He practiced law in Haarlem and was on the bench at Rotterdam from 1830 to 1851. He began his literary career in 1832 with the poem *Volharder* in which he encouraged his fellow-countrymen to war with Belgium. His best-known works are his poems *De Tocht van Heemskerk naar Gibraltar* ('The Voyage of Heemskerk to Gibraltar,' 1860) and *Jorkebed* (1861). There were published two posthumous volumes of his, entitled, respectively, *Taalkundigeopstellen* (Philological Papers, 1872) and *Wooftenboek op de dichtreken van Bilderdijk* ('Lexicon of Bilderdijk's Poetical Works,' 1878). His collected poems have been edited by N. Beets (2 vols., Haarlem, 1871). Consult his biography by J. G. Gleichmann (Amsterdam, 1875).

BOGAN, or NEW-YEAR RIVER. The Allan Water of Oxley, an interior stream of east Australia, joins the Darling after a generally northwesterly course of more than 300 miles about lat. 30° S and long. 146° E. Its source is in the Harvey Range, about lat. 33° S and long. 148° 30' E.

BOGAR'DUS, ANNEKE. See JANS, ANNEKE.

BOGARDUS, EYERARDUS (1-1647). A minister of the early Dutch Reformed church in New Amsterdam, the second minister in the colony. In 1638 he married Anneke Jans, a widow, who owned 60 acres of land in what is now an important business part of New York. The farm subsequently came into possession of Trinity Church and up to 1847 was the occasion of many lawsuits for recovery by the descend-

ants of one of the heirs of Anneke Jans and Bogardus. In 1647 Bogardus sailed for Holland to answer certain charges made by his ecclesiastical superiors, but lost his life by shipwreck in Bristol Channel. See JANS, ANNEKE.

BOGARDUS, JAMES (1800-74). An American inventor. He was born in Catskill, N. Y., and became a watchmaker and engraver. His inventions include the eight-day, three-wheeled chronometer clock, and other improvements in timepieces; the ring flyer for spinning cotton; the eccentric mill, in which both stones run the same way, but with different speed; an engraving machine; a transfer machine for producing bank-note plates from separate dies; the first dry gas meter; the first pencil case without a slot; a medallion engraving machine, a machine for engine turning, an improved method for making postage stamps, etc.; a machine for pressing glass; several machines for cutting and working india-rubber; a new pyrometer; a dynamometer; and other contrivances of less importance. In 1847 he erected in New York for his factory a cast-iron building, the first one of that material ever erected. Soon afterward he introduced wrought-iron beams.

BOGART, b'g'art, JOHN (1836-). An American municipal engineer, born at Albany, N. Y. After graduating from Rutgers College he worked in the engineering corps of the New York Central Railroad, on the State canals of New York, and as United States engineer at Fort Monroe, Va., during the Civil War. He served for some time as chief engineer of the Brooklyn park commission and after 1877 engaged in a multitude of engineering operations, both public and private. His services were especially sought for municipal works at Albany, New Orleans, Chicago, Baltimore, Rochester, and New York. In the latter city he was chief engineer of the public parks and also constructing engineer of Washington Bridge. Besides his work on the harbors of Venezuela he served as hydraulic and electrical engineer for the development of power at Niagara Falls, and at many points along the St. Lawrence River, in British Columbia, and in the Southern States. He represented the United States government at the International Congress of Navigation at Dusseldorf, Germany, in 1902; at Milan, Italy, in 1905, and at St. Petersburg in 1908.

BOG ASPHODEL. See ASPHODEL.

BOG BUMPER, BOG JUMPER, or BOG PUMPER. Names for the bittern.

BOG BUTTER. An organic compound which has been found in the bogs of Ireland and is known mineralogically as *Butyrolite*. Its properties and chemical composition led to the supposition that it was of vegetable origin and had been formed by the decomposition of the peat in which it was found, especially so in consequence of its general resemblance to mineral resins, such as asphalt and bitumen. However, a thorough examination by McAdam in 1885 seemed to demonstrate its animal origin, as all of the samples analyzed showed the presence of hairs that were microscopically identical with those of a cow. It is probably safe to say that it is a variety of adipocere—i.e., that it was formed by the decomposition of animal matter out of contact with the air. (See ADIPOCERE.) It resembles butter in color and consistency and becomes liquid at 51° C. (123.8° F.).

BOGDANOVITCH, b'g'dā-n'v'ch, I'POLIT

FEODOROVITCH (1744-1802). A Russian poet, born at Perevolotchna, Little Russia. His fame rests entirely upon his poem *Dushenka* ('Dear Little Soul') published in 1773. Apuleius' story of Psyche, borrowed from Lafontaine's version in *Les amours de Psyche*, forms the groundwork of the poem, which is characterized by a refined and graceful style and vivacious playfulness of language. Its publication in 1783 made him famous as well as obtained for him the high favor of the court; but there can be no doubt that the popularity of the work was due as much to the adventitious circumstances in which it was produced—nothing of the kind having been previously attempted in Russia—as to its intrinsic merits. Though he wrote much afterward, he never equaled his earlier works. Indeed later criticism did not sustain the contemporary enthusiastic estimates made of this writer.

BO'GERMAN, JAN (1576-1637). A Dutch theologian, born at Oplowert, East Friesland. He actively participated in the Armenian controversy, was in 1618 president of the Synod of Dort, and in 1633 became professor of divinity at the University of Franeker. In addition to his translation of *De la punition des hérétiques* of Beza as *Van het ketter straffen* (1601), he published the polemical *Annotationes contra H. Grotium*. He prepared, in collaboration with four others, a vernacular translation of the Bible. This rendering, of which the Old Testament was for the most part by him, continues to be the common Dutch version.

BO'GERT, GEORGE H. (1864-). An American landscape painter. He was born in New York City and studied at the National Academy of Design, and afterward under Puvis de Chavannes, Aimé Morot, and Raphaël Collin in Paris. His talent is exceedingly versatile, and this has prevented his forming a pronounced style. His views of foreign cities and marines are especially popular. He has won a number of important prizes and medals and is an associate of the National Academy of Design. He is well represented by several landscapes in the Hearn Collection, Metropolitan Museum, New York City.

BOGERT, MARSTON TAYLOR (1868-). An American chemist, born at Flushing, N. Y. He graduated from Columbia College in 1890, and after four years of specialization became a member of the faculty of his Alma Mater. At first an assistant in organic chemistry, within 10 years he had reached a full professorship and finally became head of the department. Of the American Chemical Society he was president in 1907-09, and of the Chemists' Club a founder and, in 1912-13, president. He was chosen to membership in numerous other learned societies, foreign as well as American. By invitation of President Roosevelt he became a member of two important conferences on the conservation of national resources, held in Washington in 1908; and he addressed each of the four sections on land, water, forest, and minerals. He is author of more than 50 scientific papers and of numerous reviews and popular articles. Clark University conferred upon him the degree LL.D. in 1909.

BOGGS, CHARLES STUART (1811-88). An American naval officer, born in New Brunswick, N. J. He entered the United States navy as a midshipman in 1826, became a lieutenant in 1837, served in Commodore Conner's squadron

during the Mexican War, distinguished himself under Farragut at New Orleans, in April, 1862, and the same year was raised to the rank of captain. In 1870 he became a rear admiral, and three years later was retired.

BOGGS, FRANK MYERS (1855-) An American landscape and marine painter. He was born in Springfield, Ohio, and studied at the Ecole des Beaux-Arts in Paris, principally under Gérôme. In 1885 he was awarded a prize of \$2500 at a competition in New York City for his "Rough Day at Honfleur," purchased by the Boston Museum of Fine Arts. After 1881 he resided in Paris, but retained a studio in New York, which he frequently visited. Mr. Boggs is represented in the Luxembourg Museum by "La Place de la Bastille" (1882), in the Museum of Niort by "Isigny," and in several other provincial museums and private collections of France. He belongs rather to the French than to the American school.

BOGH, BËG, ERIK (1822-99) A Danish writer. He was born in Copenhagen, was schoolmaster, actor, playwright, theatre director, and journalist. He first won a considerable reputation with his comedies and farces, exceeding 100 in number, and published collectively as *Dramatiske Arbejder* (7 vols., 1858-71). He also published a volume of *Digte* (1855) and several prose works, including *Huldsbakken* (1852), *Kalisen paa Bøvnstyr* (1857), *Hundredde Viser* (1862), and *Mester Oles Prædiken* (1877). His style is in general characterized by finish rather than originality. Consult his autobiographical works, *Erindringer fra mine unge Dage* (1894) and *Min første Forfatterliv* (1897).

BOGHAZ-KIEUL, or KEUI', bô gâz' kâ'ê, or KOI' A village of Asia Minor in the vilayet of Angora, about 17 miles from the town of Yozgad, in lat 40° 1' N and long 34° 35' E. The modern village is insignificant, but the heights near by contain many ancient ruins and a number of remarkable sculptures. The place was an important seat of Illytic civilization, and fragments of pottery seem to show intercourse with the Mycenaean lands. For a description of the remains and drawings of the sculptures, consult Van Lennep, *Travels in Asia Minor* (London, 1870), and for the recent excavations, E. Chantre, *Mission en Cappadoce* (Paris, 1898), whose statements as to a Babylonian colony must be received with caution. Consult also Hall, *Oldest Civilization of Greece* (London and New York, 1901). The remains mentioned above are commonly regarded as those of the town of Pteria (q.v.), but the identification is not yet completely proven. Consult Puchstein, *Boghazkoï, die Bauwerke* (Leipzig, 1912).

BOG HEAD MINERAL See TORBANTITE.

BOG-IRON ORE A name applied to deposits of limonite (hydrous ferric oxide) that are often found in alluvial soils, bogs, meadows, lakes, etc. It is abundant in some of the northern and western islands of Scotland and in the northern countries of Europe generally, also in North America. Sometimes the ore accumulates with great rapidity, thus, in some Swedish lakes a layer half a meter (20 inches) thick accumulates every 15 to 30 years. Its constituent iron is dissolved out from the rocks by spring water, from which it is precipitated in an insoluble form when exposed to the air. The amount of iron oxide in the ore commonly

ranges from 40 to 50 per cent, phosphoric acid is usually present in quantities varying from 2 to 11 per cent, silica, alumina, oxide of manganese, and other substances make up the rest. The color of the ore is brown—either yellowish brown or blackish brown. Some varieties are earthy and friable and are formed of dull, dusty particles, others are in masses with an earthy fracture, often vesicular, still others are more compact and have a conchoidal fracture. The ore is often mixed with so much clay and sand that these have to be separated by washing before the ore can be used. Owing to the low percentage of iron, the commercial value of bog-iron ore is rarely very high, although the quality of the iron yielded is good. This type of ore is worked in Quebec, but not in the United States. See IRON, LIMONITE.

BOGISH, bô'gâ-shih, BALTHASAR (1840-1908) A Slavic jurist. He was born in Ragusa-Vecchia (Dalmatia) and studied in Vienna, Berlin, and Paris. In 1869 he was appointed professor of the history of Slavic law at Odessa and was then charged with the task of elaborating a code of civil laws for Montenegro. In 1893-99 he was Minister of Justice in Montenegro. He published several important studies, such as *Compilation of Legal Usages among the Southern Slavs* (1874) and *Aperçu des travaux sur le droit coutumier en Russie* (1879).

BOGLIPOOR See BHAGALPUR.

BOG MOSS See SPHAGNUM.

BOGNOR, bôg'nêr A popular seaside resort in Sussex, England, on the English Channel, 5½ miles southeast of Chichester (Map England, F 6). It has a fine pier and esplanade. Pop., 1891, 4600; 1901, 6200; 1911, 8142.

BO'GO A seaport town of Cebu, Philippines, situated 56 miles north of Cebu. It has an excellent harbor and is connected by canal with the opposite shore of the island. Pop., 1903, 14,915.

BOGODUKHOV, bô'gô-dû'kôf, or BOHO-DUKHOV A fortified town of Russia, capital of a district in the government of Kharkov, 40 miles northwest of the city of that name (Map Russia, E 4). A town of some commercial significance until 1820, it has now lost all of its importance owing to new railways which have transferred its trade to other towns. The manufacture of leather, flax, and fur goods are the leading industries. Pop., 1897, 12,000.

BOG'OMILES. A religious sect which came into notice in the twelfth century, whose chief seat was in Bulgaria. They spread especially among the Slavic races. Their name, if derived from the Slav *Bog*, 'God,' and *miluy*, 'have mercy,' may perhaps refer to the frequency of their prayers, but more likely it comes from Bogomil, the name of their founder. The basis of their creed was as follows: God's first-born son was Satanael, at first good, he afterward rebelled and created in opposition to the original spiritual universe a world of matter and human beings. These human beings, however, received from the Supreme Father a life spirit, but this was kept in slavery by Satanael until a second son of God, the Logos or Christ, came down from heaven, and, assuming a phantom body, broke the power of the evil spirit, who was henceforth called only Satan, the divine name, *El*, being dropped. The Bogomiles, like all similar sects, practiced a severe asceticism, despised images, and rejected the sacraments. Instead of baptism they placed their hands and the

Gospel of St. John on the head of the neophyte, singing at the same time the Lord's Prayer, which they repeated seven times during the day and five times during the night. They accepted the whole of the New Testament, but of the Old Testament only the Psalms and Prophets, which they interpreted allegorically. Their morality was high, and their ideals of life seem to have been much above the average of their time. In 1118 that vehement hater of heretics, Alexius Comnenus, burned their leader Basilus. Persecution, however, did not put an end to the Bogomiles, and at the time of the Mohammedan conquest of Bosnia (fifteenth century), it is said that the greatest number of the Christians who embraced the religion of the conquerors belonged to this sect. There are some Bogomiles even at the present day. Consult Heard, *The Russian Church and Russian Dissent* (New York, 1887).

BOGORODSK, bō'gō-rōtsk'. The chief town of a district in the government of Moscow, Russia, 52 miles east-northeast of the city of Moscow, on the Klyazma, and on a branch of the Moscow and Nizhni-Novgorod Railway (Map: Russia, E 3). It carries on a prosperous trade in silk and cotton fabrics, produced in the mills of the district, and in woollens, brandies, and liquors manufactured in the town. Pop., 1888, 2470; 1897, 11,200.

BOGOS, bō'gōz. An Abyssinian tribe inhabiting the highlands north of Abyssinia, about Keren. They speak a Hamitic language called Bilin, which is akin to the Agau, though Tigré is very generally understood among them. Their name, Bogos, means 'robber.' They are slightly above the medium stature, rather robust, and in color reddish brown, betraying an admixture of negro and other blood. Primarily they belong to the Hamitic group. They are largely nomadic and pastoral. Nominally the Bogos are Christians, but the Christian religion has no very strong hold upon them. Their territory was for a long time an object of dispute between Egypt and the Abyssinian kings. It now forms a part of the Italian colony of Eritrea. Consult: Munzinger, *Ostafrikanische Studien* (Schaffhausen, 1864); Brinton, *Races and Peoples* (New York, 1890); Littman, *Bibliotheca abyssinica* (Leiden, 1904-11).

BOGOSLOV, bō'gō-slov'. A volcanic islet off the northwest coast of Unalaska in the Aleutian Islands, Alaska, U. S. A. (Map: Alaska, D 8). It was formed by a volcanic upheaval in the year 1706. It is a haunt of sea lions.

BOGOTÁ, bō'gō-tá' (under Spanish rule Santa Fé de Bogotá). The capital of Colombia and of the department of Cundinamarca, an archiepiscopal city situated on a plateau, 8675 feet above sea level, at the western base of the Guadalupe and Monserrate mountains, in the eastern Cordillera of the Andes, 4° 35' 3" north of the equator (Map: Colombia, C 8). The plateau is surrounded by high mountains on all sides, except to the west, where the river Bogotá, or Funza, cuts a narrow channel through a rocky precipice, on its way to the Magdalena, and 14 miles from the city leaps from a height of over 475 feet, forming what is called the fall of Tequendama. The climate of Bogotá is moist and moderate, the temperature varying between 57° and 61° F., with two rainy seasons each year. The city is regularly laid out, is rhomboidal in shape, and occupies an area of 6 square miles, measuring 3½ miles from north

to south and half that length from east to west. The city is divided into four parts by the San Francisco and San Agustín rivers, which are crossed by 20 bridges. The streets cross at right angles; for the most part they are narrow but well paved. Around the principal square, la Plaza de la Constitución, or de Bolívar, are the government buildings and the cathedral, a magnificent edifice in the Corinthian style. In the middle is the bronze statue of Bolívar by Pietro Tenerani. The city has two theatres. With educational institutions Bogotá is well provided, these including a national university, three endowed colleges, a national academy, a school of chemistry and mineralogy, a library of some 50,000 volumes, a national observatory, a military school, a museum of natural history and antiquities, and a botanic garden. The museum and library are situated in a former Jesuit monastery. The museum contains many interesting specimens of Inca civilization, and the library has a rich collection of plants and national literature. Bogotá is one of the principal centres of mediæval clericalism in South America, and it has many churches and convents. In some of the churches are paintings by Murillo, Spagnoletto, and Vasques. Besides the national university there are colleges and schools giving instruction to more than 10,000 children of both sexes. There are about 40 periodicals of all sorts, and the city ranks among the foremost in South America for culture and education. The city is governed by a municipal council that elects the mayor and also the police inspectors of the wards (barrios), while one of the President's secretaries is the governor of the department. There is rail connection with Facatativá (25 miles), Zipaquirá (37 miles), Soacha (7 miles), and by way of Facatativá, with Girardot on the Magdalena River. The geographical situation is unfavorable to any great commercial or industrial development. The industries include the manufacture of cloth, carpets, matches, glass, cordage, and porcelain. The district north and east of Bogotá is rich in coal, iron, limestone, sand, manganese, and fire clay. At Zipaquirá, north of Bogotá, are large salt mines, worked by the government, which supply nearly all of Colombia with salt and are a great source of revenue.

BOG SPAVIN. See SPAVIN.

BOG-TROTTER. An appellation sometimes contemptuously given to the lower class of the Irish peasantry. It owes its point to the ability acquired by many of them of traversing the extensive bogs of their native country, where a stranger would find no secure footing, and in the frequent use which they have made of this means of escape from soldiers, officers of police, or other pursuers.

BOGUE, bōg, DAVID (1750-1825). A Scottish preacher, and the organizer of the London Missionary Society. He was born at Hallydun, parish of Coldingham, Berwickshire, and was educated at Edinburgh University and in 1771 went to London, where he was for some time employed as a teacher. He afterward accepted the charge of an Independent church at Gosport, where he established a seminary for the education of students who purposed to become Independent ministers, and in 1795, he and others organized the London Missionary Society. He also took an active part in the establishment of the British and Foreign Bible Society and of the Religious Tract Society. He

was the author of *An Essay on the Divine Authority of the New Testament* (1801), which was translated into German, French, Spanish, and Italian, *Discourses on the Millennium* (1813-16), and in conjunction with Dr James Bennet, a *History of Dissenters, from 1688 to 1808* (1812). Consult Moirson, *Fathers and Founders of the London Missionary Society* (London, 1840), McLean, *Epoch Makers of Modern Missions* (Chicago, 1912).

BOGUE, LILLIAN BELL. See BELL, LILLIAN
BOGUE, VIRGIL GAY (1846-) An American engineer, born in Norfolk, N. Y. He graduated (C.E.) from the Rensselaer Polytechnic Institute, was assistant engineer of Prospect Park, Brooklyn, in 1868, and for the next decade was engaged in railway work in Peru. For 12 years he was employed by the Northern and Union Pacific companies, discovering in 1881 "Stampee Pass" across the Rocky Mountains. Establishing himself as a consulting engineer in New York City, he added to his other duties after 1905 those of chief engineer and vice president of the Western Pacific Railroad. His services were sought in improving the navigation of the Columbia River, in making plans for the harbor of Tacoma, Wash., and in projecting a new railway across South Island, New Zealand.

BOGUE FORTS See BOCA TIGRIS
BOGUSLAV, bö'gu-slav' A town of the government of Kiev, Russia, situated on the river Rossoa, about 100 miles from the city of Kiev. It has trade in woollens, leather, and sheepskins. The town was annexed to Russia in 1793.

BOGUSLAWSKI, bö'gu-slaw'ski, ADALBERT (1750-1820) A Polish actor and playwright, born in Ghino. In 1790 he was appointed director of the Royal Theatre in Warsaw, where he established a school of dramatic instruction. He is to be regarded as the real founder of a Polish national drama, to whose repertory he contributed a large number of translations and original works. He also introduced opera into Poland. A complete edition of his dramas, in 9 vols., appeared in Warsaw in 1820-25.

BOHADDIN, bö'ha-dén', or **BAHA-AL-DIN** (ABU'L MAHASIN YUSUF IBN RAPT IBN SHADDAN) (1145-1234) An Arabian historian and statesman. He was born in Mosul, and after concluding his studies there settled first as a tutor in the Nizamiya at Bagdad, but in 1173 he returned to his native place and became professor at the high school of Mosul. In 1187 he went on a pilgrimage to Mecca and Medina and later to Jerusalem and Damascus. By a work on the *Laus and Discipline of Sacred War* he attracted the attention of Saladin, and until the death of that prince he was in his employ as cadí of Jerusalem and of the army. After the death of Saladin he remained in the service of Saladin's successors, Malik al Zahir and Malik al Aziz, as cadí of Aleppo, where with his own means he established two schools. His most important work was a *Life of Saladin*, which was published with a Latin translation by Schultens (Leyden, 1732). Consult C. R. Conder, *The Life of Saladin by Beha ad Din*, compared with the original Arabic and annotated with a preface by Ch. Wilson (London, 1897). There are manuscripts of *A History of Aleppo, The Foundations of Jurisprudence, and Lectures on the Hadith* (or Tradition) by Baha-al-din. Consult, also, Brockelmann, *Geschichte der arabischen Literatur*, vol. 1, pp. 316 f (1898).

BOHEMIA (ML from Lat *Boiohamum*, from Boii, a Celtic tribe + OHG, *heim*, Old Sax *hēm*, home, called by its Slavic inhabitants, the Czechs, Cechy) A former kingdom of Europe and now a crownland of the Cisletian (Austrian) half of the Austro-Hungarian Monarchy (Map Austria, D 2). It occupies the northwestern end of Austria and is bounded by Saxony on the northwest, Prussian Silesia on the northeast, Moravia and Lower Austria on the southeast, Upper Austria on the south, and Bavaria on the southwest. Extending from lat 48° 34' to 51° 3' N and from long 12° 7' to 16° 50' E, it comprises an area of 20,064 square miles, peopled by 6,769,548 inhabitants, according to the census of 1910.

Bohemia is separated from Germany by mountain barriers, which cover all the three sides on which it touches that Empire. The Bohemian Forest forms the boundary line on the southwest, the Erzgebirge, or Ore Mountains, on the northwest, and the Riesengebirge, or Giant Mountains, on the northeast. These mountain ranges, together with the Bohemian-Moravian highlands, in the southeast, form a great basin, in the shape of a lozenge. In the interior are some minor elevations. The rivers of Bohemia, with a few exceptions, flow from south to north. The Elbe, which rises on the northeastern frontier, with its numerous tributaries, drains the larger part of the area. After the Elbe, the chief rivers of Bohemia are the Moldau and the Eger, both tributaries of the Elbe. In the northwestern part of the country are famous mineral springs, including those of Karlsbad, Marienbad, Franzensbad, and Teplitz.

The climate of Bohemia is continental in its character. The average annual temperature of Prague, in the centre of the region, is 48.6°. The maximum reached at Prague, for a period of 30 years, is 97.5° F., and the minimum is 13.24° F. The climate is healthy throughout, mild in the valleys and cold in the mountains, the higher peaks being covered with snow during a considerable part of the year. The country is peopled mainly by Czechs or Bohemians who are Slavs. About two-fifths of the population consists of Germans. Keen rivalry exists between these elements.

Bohemia is still an agricultural country, although some of its manufactures have attained a very high degree of development. The soil is generally fertile, especially in the districts along the upper Elbe, in the vicinity of Königgrätz, in the valley of the Elger, in the lands called the "Paradise," near Teplitz, and in a tract in the midland mountains. Of the total area, 5,104,810 hectares, 2,623,105 hectares in 1910 were in arable land, 60,363 garden, 778,874 meadow and pasture, 1,507,327 forest, and 38,705 lake, swamp, etc. Of the arable land in 1910 rye was planted to 560,560 hectares; wheat, 234,152; barley, 300,593; oats, 407,997; pulse, 40,011; potatoes, 295,772; sugar beets, 143,878; hops, 14,715. A great part of the land is divided into small holdings. In 60 per cent of it are about 600,000 holdings, half of which embraces less than half a hectare each. The remainder is divided into about 1800 holdings. Cattle raising forms an important adjunct to agriculture. Horned cattle, goats, and swine are reared extensively in some districts, and in the south geese form an important item in the resources of the country. At the end of 1910 there were 250,000 horses, 2,201,000 horned

cattle, and 1,013,000 sheep. Silk culture and bee keeping receive considerable attention.

The forests of Bohemia, in which various kinds of game are found, are very extensive, and the lumber industry gives occupation to a considerable part of the population. Next to agriculture, mining occupies the first rank. In regard to its mineral deposits, Bohemia stands first among the crownlands of Austria, the annual value of its mineral products exceeding \$35,000,000. The value in kronen in 1909 was 166,908,595, of which the value of lignite was 104,524,589, coal 46,715,917, iron ore 10,784,178, silver ore 3,385,723, and gold ore 593,980. Bohemia is famous for its manufactures of glass, and its textile industries are on a vast scale. The manufacturing of beet sugar is also very important, as well as the distilling of spirits. There are large iron and steel works, and the manufacture of chemicals is extensively carried on. Among other important industries are the manufacture of agricultural implements, paper making, and milling. The beer of Pilsen and the china of Karlsbad are celebrated. The tobacco factories employ about 10,000 hands, mainly women. In general Bohemia is not only the most important manufacturing crownland of Austria, but also one of the most advanced among the manufacturing countries of Europe. Most of the manufacturing is on a large scale, and the tendency towards concentration is very pronounced. There are still, however, a number of industries carried on almost exclusively in the houses of the workmen, such as lace knitting, the manufacture of toys, musical instruments, etc.

The commerce of Bohemia is naturally very extensive and is greatly facilitated by the numerous financial institutions, as well as by the excellent transportation facilities. In 1909 Bohemia had 66.52 kilometers (41.33 miles) of railway, or 29.73 per cent of the total for Austria. The chief navigable river is the Elbe, and there is also a considerable mileage of artificial waterways.

The Diet of Bohemia consists of 242 members, including the Archbishop of Prague, the heads of the three sees of Leitmeritz, Königgrätz, and Budweis, two rectors of universities, 70 representatives of the large landholders, 87 representatives of towns and chambers of commerce and industries, and 79 representatives of the rural communities. The representatives of the landed aristocracy, as well as those of the towns and industrial centres, are elected directly on a property qualification, while the delegates from the rural communities are elected by a board of electors returned by voters paying a certain amount of taxes. Bohemia is represented in the Lower House of the Austrian Reichsrat by 130 members.

Public education in Bohemia is well advanced, and the line of demarcation between the two elements of the population, Czech and German, is sharply drawn. At Prague there is a Czech university (1065 students in 1912) and a German university, founded in 1348 (4414 students). In 1912 there were 77 gymnasia and realgymnasia (18,770 students) and 46 realschulen (15,872), besides several technological institutes, middle schools, and commercial and other special schools. The public elementary schools in 1909 numbered 8153 (of which 2548 were German), with 1,129,811 pupils; private elementary schools, 228, with 22,112 pupils.

About 98 per cent of the school population is in attendance.

The population of Bohemia in 1890 was 5,843,049; in 1900, 6,318,697, and in 1910, 6,769,598, or 337 per square mile, making Bohemia one of the best-populated crownlands of Austria-Hungary. The increase for the decade 1900-10 was 7 per cent, against 8.10 per cent for the period of 1890-1900. In regard to nationality, the population is 63 per cent Czech (see division on *History*) and 37 German. The Catholic religion is professed by 96 per cent of the population, while somewhat more than 2 per cent belong to the different Protestant denominations and 1.6 per cent profess the Jewish religion. The capital city, Prague, had a population of 223,741 in 1910.

History. In the first century B.C. the Celtic people, called Boii, who had settled in Bohemia and who gave it its name, were compelled by the advance of the Germans to emigrate from the country. Bohemia was then occupied by the warlike tribe of the Marcomanni. At the time of the great migration of nations the Marcomanni moved westward, and in the sixth century we find the region peopled by Slavic immigrants, who soon appear under the common name of Czechs. By the close of the ninth century the petty chiefs who ruled the Czechs had been converted to Christianity, which in the main was introduced by the Germans, while the conversion of the adjoining Moravians was undertaken by the great missionaries of the Eastern church. For a brief period Bohemia formed part of the great Moravian realm of Svatopluk, which fell before the onslaught of the Magyars at the beginning of the tenth century. From about that time Bohemia was united under the sway of a line of dukes of the house of Přemysl, who acknowledged the overlordship of the kings of Germany. In the latter part of the tenth century the bishopric of Prague was constituted. The princes of the house of Přemysl sought to elevate themselves to the rank of kings, and from the close of the twelfth century they were permanently recognized as such by the German sovereigns, their state forming part of the Holy Roman Empire of the Germans. Under Ottokar II (1253-78) Bohemia was for a brief period one of the most powerful realms in Europe. His sway extended from the region of the Elbe to the shores of the Adriatic. Ottokar succumbed to the arms of the Emperor Rudolf of Hapsburg, and his realm was dismembered. His son, Wenceslas II (1278-1305), who succeeded him in Bohemia and Moravia, was also King of Poland. Ottokar II and Wenceslas II did much for the civilization and economic development of Bohemia by encouraging the immigration of German artisans and colonists. With the death of Wenceslas III, in 1306, the dynasty of Přemysl became extinct. From 1310 to 1347 Bohemia was ruled by a line of kings of the house of Luxembourg—John (1310-46), Charles (1346-78), Wenceslas IV (1378-1419), Sigismund (1419-37). The last three were emperors of Germany. Charles of Luxembourg, who was German Emperor as Charles IV, exerted himself in every way to promote the welfare and greatness of Bohemia. In 1348 he founded the University of Prague, the first established within the bounds of the old German Empire. The good work of Charles was to a great extent undone by the incompetence of his son, Wenceslas. His reign witnessed the great religious movement inaugu-

rated by John Huss and Jerome of Prague. This was one of the most significant anticipations of the Reformation of the sixteenth century. The Hussite Wars broke out in the year in which Wenceslas died and lasted almost to the end of the reign of his successor, Sigismund, who, in addition to being German Emperor, was King of Hungary, but up to 1434 was unable to make his power recognized in Bohemia. The Bohemians heroically repulsed the crusading forces of the Catholic church and then engaged in a bloody internecine religious strife.

The Hussite movement quickened the spirit of nationality among the Czechs and arrested the process of Germanization which had made such progress under Charles of Luxemburg. Endless internal dissensions and the extraordinary complexity of the political fabric, with its name of jurisdiction, stood, however, in the way of the election of a permanent Slavic monarchy. From 1458 to 1471 the throne of Bohemia was occupied by the shrewd and able George Podiebrad. His successor, Ladislas II, of the Polish house of Jagellon (1471-1516), was chosen to succeed Matthias Corvinus on the throne of Hungary. Louis, the son and successor of Ladislas II, was likewise King of Hungary. He lost his life in 1526 on the field of Mohács, where Sultan Solyman the Magnificent overwhelmed the Hungarians. The Estates of Bohemia now bestowed the crown upon Louis' brother-in-law, Ferdinand of Hapsburg, the brother of the Emperor Charles V. Ferdinand ruled over the old hereditary dominions of the house of Austria and simultaneously with his election in Bohemia was chosen King by a portion of the Hungarians. Thus were laid the foundations of the Slav-German-Magyar state of Austria-Hungary. The Bohemian realm, or the lands belonging to the crown of St. Wenceslas, at this time included Bohemia, Moravia, Silesia, and Lusatia. The crown of Bohemia soon became virtually hereditary in the house of Hapsburg. The Hussite movement had paved the way for the introduction of the Reformation into Bohemia. The Hapsburgs directed their energies towards the suppression of Protestantism, and in the struggle that ensued Bohemia lost alike her political freedom and her religious liberties. Ferdinand I was unable to stem the progress of the Reformation, which continued to spread rapidly under his successors. Bohemia had arrived at a high state of culture at this time. The University of Prague was one of the greatest seats of learning in Europe. The national literature of the Czechs witnessed its Golden Age in the first century after the Reformation. In 1618 the Protestants of Bohemia rose against the Hapsburgs and by the *defenestration* of Prague precipitated the struggle of the Thirty Years' War. In 1619, on the death of King Matthias, the Bohemian estates placed the crown upon the head of the Elector Palatine, Frederick V, the so-called "Winter King," (son-in-law of James I of England) who had to take up the struggle against the Catholic League of Germany, in arms for the newly elected Emperor of Germany, the bigoted Ferdinand II of Austria. The Catholic forces triumphed at Prague (battle of the White Mountain) in November, 1620. Bohemia lay prostrate at the feet of Ferdinand, who wreaked his vengeance in a merciless way, crushed out Protestantism, and turned the country over to the Jesuits.

Bohemia was a bloody battle ground in the Thirty Years' War, which ended where it had

begun, at Prague. It is estimated that the population of about 2,000,000 was reduced to 700,000, and the civilization of the country suffered a blow from which it never recovered. The people bore meekly the rule of the Hapsburgs, no considerable portion of the population being any longer estranged from them by differences of religion. After the accession of Maria Theresa Bohemia became a chief battle ground for the attacks of Frederick the Great of Prussia who succeeded in despoiling the kingdom of much of its dependent territory. Under her son the Emperor Joseph II Bohemia was deprived for a time of her National Diet. In the latter part of the eighteenth century, however, there was a vigorous reawakening of the national feeling among the Czechs, which, under the stimulus of patriotic writers, gradually developed into an active yearning for national independence. An emphatic utterance was given to this sentiment in 1848, when a Pan-Slavic Congress was convened in Prague. At this time the capital was the scene of an insurrection, which was suppressed by the guns of Windischgrätz. Since then the efforts of the Czechs to regain their autonomy have played an important part in the history of the Empire. The reorganization of Austria-Hungary on the present dualistic basis only intensified the antagonism between the Germans and the Slavs of Bohemia. The Czechs refused to enter the Vienna Reichsrat of 1867, then leaders, Palacky and Rieger, ostensibly attended the Pan-Slavic Congress at Moscow in 1868, and the demands for national autonomy grew more emphatic with each concession, made by the Taaffe and Badeni ministries, as to the establishment of a Czech university at Prague and the status of the Czech language in the courts and the administration. United as the Czechs are against the Germans on national issues, they are sharply divided within themselves on other points, the Old Czechs representing the feudal and clerical party, and the Young Czechs the radical and irreconcilable element. It is the latter that has within recent years placed itself into such violent antagonism to German pretensions in the Vienna Reichsrat. The apparent impossibility of reconciling the Czechs to the existing order of things in Austria-Hungary constitutes the chief danger that threatens the stability of the Empire. Nor does there seem to be any lessening of the tension. In 1897 a cabinet crisis was caused by the introduction by the government of a bill which made a knowledge of the Czech language compulsory for all officials. In 1910 another bitter struggle ensued which ended by a compromise, each self-governing community in Bohemia being permitted to choose whatever language it pleased. But this compromise did not last long. In fact, so serious had the situation become in 1913 that in that year the autonomy of Bohemia was suspended, the diet dissolved, and a concession of administration appointed.

Consult Bourlier, *Les Tricèques et la Bohême contemporaine* (Paris, 1897), Count Litvov, *Bohemia. An Historical Sketch* (London, 1896), id., *Lectures on the History of Bohemia* (Oxford, 1906), Maurice, *Bohemia from the Earliest Times to 1620*, a popular account in the "Stories of the Nations Series" (New York, 1896), Denis, *Jean Hus, et la guerre des Hussites* (Paris, 1878), also by the same author, *Fin de l'indépendance bohème* (Paris, 1890), *La Bohême depuis la Montagne Blanche* (Paris, 1903), and

Monroe, *Bohemia and the Czechs* (Boston, 1910).

BOHEMIAN BRETHREN. See BRETHREN, BOHEMIAN.

BOHEMIAN FOREST, or **BOHMERWALD**. The old Sylva Gabreta of the Romans. A mountainous region of central Europe, separating the Austrian crownland of Bohemia from the German Kingdom of Bavaria, and extending from the Fichtelgebirge on the northwest to the Danube, below Passau, on the southeast. It forms part of the watershed between the basins of the Elbe and the Danube (Map: Germany, E 4). The region is about 125 miles long and from 20 to 40 miles wide and covers an area of about 4400 square miles, of which a considerable portion in the southwest belongs to Bavaria and forms what is known as the Bavarian Forest, or *Bayrischer Wald*. The region is thickly covered with forests, which grow to an altitude of 4000 feet, and abounds in picturesque scenery. The highest summits, which are found in the Bavarian section, in the group of the Arber (Great Arber, Raschel), exceed 4700 feet. The rock formation is chiefly granite, schist, and gneiss. The rainfall is very heavy, and there is an abundance of pasture. The chief product is grain. The inhabitants of the region are chiefly Germans and Czechs.

BOHEMIAN GIRL, THE. See BALFE.

BOHEMIAN LANGUAGE AND LITERATURE. See under CZECH.

BOHEMIAN MUSIC. See SLAVONIC MUSIC.

BOHEMUND I (Lat. *Bohemundus*) (c.1055-1111). The eldest son of Robert Guiscard, the Norman Duke of Apulia and Calabria, born some time between 1052 and 1060. He distinguished himself in the war carried on by his father against Alexius Comnenus (1081-85). Robert Guiscard died in 1085, leaving his property to his younger son, Roger, but Bohemund fought with the latter until 1089, when a peace was made by which Bohemund received a part of Apulia. When the First Crusade was preached, Bohemund saw in it an opportunity for extending his possessions. He was the ablest of all the Crusaders, and as long as he remained with them was really their leader, although not officially recognized as such. In June, 1098, when Antioch was captured, he received it as a principality and remained there, taking no further part in the expedition against Jerusalem. In August, 1100, he was captured by the Mussulmans and held a prisoner until May, 1103. During his absence his cousin, Tancred, ruled over Antioch. In 1104, after suffering a great defeat, he returned to the west to seek aid, and (1106) while in France married Constance, the daughter of Philip I. In 1107 he found himself at the head of a large army of adventurers, who had been attracted by his renown. Instead of returning to Antioch he led his forces against the Greek Empire, with which he had been at enmity since 1098. He failed, and after a year's fighting a peace was made by which Bohemund became the vassal of the Emperor for his principality of Antioch. He never returned to Syria, going instead to Apulia, where he died in 1111. Consult Hagenmeyer's *Gesta Francorum* (Heidelberg, 1890), which, in the notes, gives full reference to all facts.—**BOHEMUND II**, son of Bohemund I was a minor at the death of his father, and became Prince of Antioch only in 1126. He was killed in battle in 1130. The later rulers of this name are **BOHE-**

MUND III (1163-1199); **BOHEMUND IV** (1200-33); **BOHEMUND V** (1233-50); **BOHEMUND VI** (1251-63); **BOHEMUND VII** (1268-87), the last Prince of Antioch. Consult Röhrich, *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898); Kugler, *Boemund und Tancred* (Tübingen, 1862).

BOHIO, LAKE. See MAP OF PANAMA CANAL.

BÖHLAU, ULOU, HELENE (1850-). A German novelist, born at Weimar. She traveled extensively in the East and at Constantinople married Omar al-Rashid Bey, with whom she settled in Munich. She became known in 1888 for her *Ratsmädchengeschichten*, a series of delightful genre pictures of the Weimar of classic days. The best of these is the last story, *Das Gometchen*. Her works include: *Novellen* (1882); *Es hat nicht Sein Sollen* (1891); *Das Recht der Mutter* (1896; new ed., 1903); *Neue Ratsmadel- und Weimarische Geschichten* (1897); *Halbblut* (1899); *Sommerbuch* (1902); *Die Krustallkugel* (1903); *Iselies* (1911).

BOHLEN, BÖHLEN, PETER VON (1796-1840). A well-known German Oriental scholar. He was born at Wüppels in Oldenburg, studied at Halle and Bonn, and after 1826 was professor of Oriental languages at Königsberg. Among his publications are *Das alte Indien* (2 vols., 1830-31), *Die Genesis historisch-kritisch erläutert* (1835), and editions of the *Sententia* of Bhartihari (1833) and the *Ritasandhara*, of Kalidasa (1840). Consult his *Autobiographie*, edited by Voigt (Königsberg, 1841).

BÖHM, BEM, RICHARD (1854-84). An African explorer. He was born in Berlin, studied zoölogy, and in 1880 went with Paul Richard to Zanzibar. In the following year he made an expedition to the interior of the Continent and visited Lake Tanganyika. He died of fever in the Urma district. He published numerous zoölogical, especially ornithological, observations. His letters from East Africa were published with a biographical sketch by H. Schalow under the title *Von Sansibar zum Tanganika* (Leipzig, 1888).

BÖHM, BEM, THEOBALD (1794-1881). A Bavarian flute player and manufacturer of wind instruments. For many years he was first flutist of the Royal Orchestra of Munich. His improvements in the construction of the flute not only revolutionized flute building, but led to important improvements in the construction of all the wind instruments. After he had become convinced that the size and relative distance of the sound holes must be determined solely in accordance with the laws of acoustics, he associated himself with the eminent scientist Karl von Schaffliuti. He thus established the proportions of the various parts and secured not only a maximum volume, but also a wonderfully soft quality of sound. He wrote *Ueber den Flötenbau und die neuesten Verbesserungen desselben* (1847), and *Die Flöte und das Flötenspiel*, and also had some reputation as a composer. Consult Christopher Welch, *History of the Boehm Flute* (London, 1883).

BÖHME, BEME, or BÖHM, BEM, JAKOB (1875-1924). A German theosophist and mystic. He was born of peasant parents at Altsiedenberg, near Gërlitz, in Upper Lusatia, and spent his boyhood in tending cattle. He learned the trade of a shoemaker. About 1612 he composed his first book, called *Aurora, oder die Morgenröte im Aufgang*. The manuscript fell

into the hands of the authorities, got him into trouble, and was condemned as heretical. It was not published till 1634. Bohme's fundamental doctrine is that everything exists and is intelligible only through its opposite. Thus, in the very nature of goodness evil is necessary as an element in its perfection. Without evil the will would rest content with its present state and progress would be impossible. God himself contains conflicting elements in His nature, the whole sensible universe being a constituent in His divine holiness. Bohme stated his doctrine in technical theosophic language which makes it quite unintelligible to the uninitiated. Numerous attacks from theologians disturbed Bohme's last years, but he bore them all with great meekness. They were probably occasioned by a tract on repentance, *Der Weg zu Christo*, which his friends had printed without his knowledge. In addition to the two works already mentioned, perhaps his *Mysterium Magnum* should be noted as a characteristic production. The best collection of his writings was published (1832-60), by Scheibel, at Leipzig. Next to Germany, Holland and England are the countries in which Bohme's works have been received with most favor. In England, where Bohme was generally called Boehmen, a translation of his works was published (1644-62). In 1697 Jane Lead, a disciple of Bohme, founded a sect called the Philadelphians. In some respects Bohme anticipated the views of such absolutists as Spinoza, Schelling, and Hegel. The intellectual contemplation of the absolute, out of which the contradictions in the world of phenomena proceed and into which they return, is common to these absolutistic systems and to Bohme. Hegel, indeed, expressly represents Bohme's negativity, the active principle of development, as an obscure foreshadowing of his own intuitions, and on that account places him at the head of modern philosophy. Consult Hamberger, *Die Lehre des deutschen Philosophen Jacob Bohme* (Munich, 1844), Fechner, *Jacob Bohme, sein Leben und seine Schriften* (Gotha, 1857), Peip, *Jacob Bohme, der deutsche Philosoph* (Leipzig, 1860), Carrere, *Die philosophischen Anschauungen des Reformationszeit* (Leipzig, 1887), Hartmann, *Life and Doctrines of Bohme* (London, 1893).

BOHMER, bē'mēr, JOHANN FRIEDRICH (1795-1863). A German historian. He was born in Frankfurt-on-the-Main, studied in Heidelberg and Göttingen, and from 1830 to 1862 was librarian of Frankfurt. In various libraries and archives of the Continent he made valuable researches for the sources of German history during the Middle Ages, and the results are embodied in his works, especially the following: *Urkundenbuch der Reichsstadt Frankfurt* (1836, new ed., 1901), a series of *Regesta Imperii* (1833, 1839, 1844, 1849, new eds of various dates), *Fontes Rerum Germanicarum* (4 vols., 1843-68). Consult Janssen, *J. F. Böhmers Leben, Briefe, und Kleinere Schriften* (Freiburg, 1868).

BOHMERWALD, bē'mēr-wā'lt. See BOHEMIAN FOREST.

BOHMISCH-LEIPA, bē'mish lē'pā. See LEIPA.

BOHN, bōn, HENRY GEORGE (1796-1884). An English author, translator, and publisher, of German parentage, born in London. He rendered a valuable service to the English-speaking

world by republishing at a cheap rate a vast number of the most valuable works in literature, science, philosophy, and theology. He obtained distinction as the editor of the *Bibliotheca Parnassica*, of Lowndes's *Bibliographer's Manual* (1857-58), and as a translator of Schiller, Goethe, and Humboldt. He also compiled a *Polyglot of Foreign Proverbs* (new ed., 1884), a *Practical Handbook of Modern Geography* (1847), a *Handbook of Pottery and Porcelain* (1849), and a *Dictionary of Quotations* (1887). He acquired great wealth and made valuable collections of china, paintings, ivories, etc.

BOHNENBERGER, bō'nōn-bēn'k'ēr, JOHANN GOTTLIEB FRIEDRICH VON (1765-1831). A German astronomer and mathematician, born at Simmozheim, Württemberg. He studied at the University of Tübingen, in 1796 became connected with the observatory of the university, and in 1798 was appointed professor of mathematics and astronomy. He was an assistant editor of several scientific periodicals and published *Anleitung zur geographischen Ortsbestimmung* (1795), *Astronomie* (1811), *Anfangsgründe der höheren Analysis* (1812).

BOHOL, bō-hōl'. One of the Visayas group of the Philippine Islands, in about lat 9° 50' N and long 124° 15' E, situated between the islands of Cebu, Leyte, and Mindanao (Map Philippine Islands, J 10). It is about 47 miles long and 34 miles wide. Its surface, covering 1411 square miles, is generally mountainous, and the north and west coasts are bordered by reefs. The island is not very fertile, but produces cacao, tobacco, coffee, cotton, hemp, rice, sugar, and corn. Deposits of gold, copper, phosphate, coal, and iron exist, and there are numerous mineral springs. The inhabitants are engaged chiefly in weaving silk and cotton fabrics and blankets. Pop., 1903, 243,148. Together with Siquijor, Panglao, and other neighboring islands, Bohol forms the province of Bohol, with an area of 1511 square miles, and a population (1903) of 269,223. Tagbilaran (pop., 12,108) is the capital.

BOHOR. An antelope (*Cervicapra bohor*), one of the larger reitbucks. It ranges in East Africa from Abyssinia to Rhodesia. See REITBUCK.

BOHOT. See BORS.

BOHTLINGK, bōt'lingk, OTTO VON (1815-1904). A Russian-German Orientalist and Sanskrit scholar. He was born in St. Petersburg, studied there and in Berlin and Bonn, and in 1842 returned to St. Petersburg. He became a member of the Academy of Science in 1842 and a Privy Councillor in 1875. In 1868 he left Russia and moved to Jena. In 1885 he moved again to Leipzig, where he passed the remainder of his life. In collaboration with Prof. Rudolph Roth, of Tübingen, he published his most important work, the great *Sanskrit Wörterbuch* (St. Petersburg, 1853-75). An abridgment and supplement of this appeared in 1870-80. His edition of the Sanskrit grammarian Panini (1840, 2d ed., Leipzig, 1878), and of a series of Sanskrit apothegms and proverbial verses, *Indische Sprüche* (1863-65, 2d ed., 3 vols., St. Petersburg, 1870-73), are standard works; and among his other publications are *A Sanskrit Chrestomathy* (St. Petersburg, 1845; 2d ed., ib., 1877-87), and an edition with translation of a treatise on Hindu poetics by Dandin, *Kāvya-darsa* (Leipzig, 1890). In 1888 a "Festschrift" containing contributions of many famous schol-

ars, was presented to him in honor of the 50th anniversary of his doctorate.

BOHUN. The name of an English family prominent in the thirteenth and fourteenth centuries. HUMPHREY V, de Bohun, second Earl of Hereford and first Earl of Essex (?-1274 or 1275), went on the Crusades in 1250, in 1257 was in charge of a portion of the Welsh marches, was one of the commissioners appointed in accordance with the Provisions of Oxford (q.v.), but by 1263 had gone over to the King's side and was taken prisoner at Lewes (May 14, 1264).—HUMPHREY VII (?-1298), grandson of Humphrey V, succeeded him and was prominent with Roger Bigod in opposition to the measures of arbitrary taxation resorted to by Edward I. During Edward's absence in Flanders he and Bigod obtained from the regent a confirmation of the charters, with supplementary articles whereby the King was to surrender the right to taxation without national consent. This confirmation was subsequently ratified by the King.—HUMPHREY VIII (1276-1322) married, in 1302, Elizabeth, the daughter of Edward I. He held high offices under Edward II, but joined the barons in their armed protest against Piers Gaveston, the King's favorite. After Gaveston's death Hereford (as Humphrey VIII was generally called) was again prominent in the King's service until the rise of new foreign favorites of the King. After several years of opposition, in 1321 he appeared with troops in London in revolt against the Despensers, who were forthwith banished. In October of that year, however, Edward took the field in attack upon Bohun and other rebellious lords, and Bohun was killed at Boroughbridge (Yorkshire) March 16, 1322.

BOIARDO, bô-yâr'dô, MATTEO MARIA, COUNT OF SCANDIANO (1434-94). A celebrated Italian poet, born at Scandiano. Educated at the University of Ferrara, he long resided at the Court of Borso and Ercole d'Este, Dukes of Ferrara, who were his steadfast friends and patrons. He was made Governor of Reggio in 1478, Captain of Modena in 1480, and was in 1487 reappointed Governor of Reggio, continuing in this office until his death. He began his literary work by some Latin poems in praise of the Estensi, and imitating Vergil; a dramatization of Lucian's *Timone*; verses in Italian of biographical inspiration, and translations of Apuleius and Herodotus. Encouraged in his literary ambitions by his masters, he produced his *Orlando Innamorato* (1482, pub. 1487). This poem, in octave stanzas, is interesting as forming the point of departure for Ariosto's *Orlando Furioso*. It deals with the fundamental matter of the epic of Charlemagne, already treated with genius by L. Pulci in the *Morganza maggiore*; but Boiardo's distinctive contribution is the introduction of the romantic chivalrous spirit of the Arthurian legends and the search for classic elegance in poetic dress. Aside from its historical importance, the *Innamorato* has intrinsic merit, in its richness of color in description, grace and reality of characterization, and the urbanity of its comic vein. Many completions, remodelings, and imitations of the *Innamorato* appeared after Boiardo's death. For the most important, see ARIOSTO, and BERNI. Consult: G. Bertoni, *Nuovi studi su M. M. B.* (Bologna, 1904); Solerti, *Le poesie volgari e latine di M. M. B.* (Bologna, 1894); ed. of *Innamorato* of Sonzogno (Milan, 1894), Eng. trans. by Toft (1598) and Rose (London, 1823).

BOIELDIEU, bôwîl'dyê', FRANÇOIS-ADRIEN (1775-1834). An eminent composer of French *opéra comique*. He was born Dec. 15, 1775, in Rouen, son of an archbishop's secretary. He ran away from his teacher, the organist Broche, to Paris (1787), whence he was ignominiously brought back; and Broche's lessons seem to have been all the formal instruction that Boieldieu received. The local success of his operas *La fille coupable* (1793) and *Rosalie et Myrta* (1795) induced him to go again to Paris, where he had to earn a living by tuning pianos for the Erards. Here he made the acquaintance of Méhul, Cherubini, and the tenor Garat, who made Boieldieu famous by singing his songs in public. *Les deux lettres* (1796) and *La famille suisse* (1797) had an enormous success at the Opéra Comique. He published various instrumental pieces and then triumphed again with *Le Calife de Bagdad* (1800). Some caustic remarks of Cherubini about "undeserved success" made Boieldieu apply himself to serious study of counterpoint, the results of which were noticeable in *Ma tante Aurèle* (1802). About this time his home life became so unbearable that he removed to St. Petersburg (1803) to become *maître de chapelle* to the court. In the eight years of his sojourn there he produced no work of merit, though bound by contract to write three operas annually in addition to other specified duties. Lung trouble hastened his return to Paris, where *Jean de Paris* (1812) was hailed with delight. He succeeded Méhul (q.v.) as professor of composition in 1817; *Le chaperon rouge* was given in 1818, and after a seven-year silence *La dame blanche*, generally conceded to be his masterpiece, created a veritable sensation. The next work, *Les deux nuits* (1820), had only a *succès d'estime*, and Boieldieu did not try his hand again. He retired from the Conservatory on a pension, but this was revoked by the government in 1830. Boieldieu died near Gisors, Oct. 8, 1834, of laryngeal phthisis, his sufferings somewhat relieved by the care and love of his second wife. His operas—of which *La dame blanche*, *Jean de Paris*, and *Le Calife de Bagdad* are still heard occasionally—are the finest examples of *opéra comique* in its earlier stage of development. Genuine comedy, intermingled with romanticism, seductive melody, orchestration that fairly glows with color yet never obscures the voice, grace, delicacy, and unflagging interest—such are the characteristics of Boieldieu's music. The list of works written in collaboration with Cherubini, Méhul, Isouard, Berton, Kreutzer, and others runs into dozens. Among his pupils the most famous were Adam, Fétis, Zimmermann, and Labarre. Consult A. Pougin, *Boieldieu, sa vie et ses œuvres* (Paris, 1875), Ferris, *Great Musical Composers* (New York, 1887), and Augé, *Boieldieu, biographie critique* (Paris, 1908).

BOIES, boiz, HORACE (1827-). An American politician. He was born in New York and in 1858 was a member of the New York Assembly, but removed to Iowa in 1867. In 1883 his opposition to the tariff and protection policy of the Republican party, which he had joined in early life, led him to identify himself with the Democrats, by whom in 1889 and again in 1891 he was elected Governor of Iowa. He was the leading candidate for the Democratic nomination for the presidency up to the time of the national convention of the party in 1896.

BOII, bô'î. A Celtic people, who early mi-

grated eastward from Transalpine Gaul into northern Italy, Bohemia, and the region of the eastern Alps. In Italy they stubbornly resisted the Romans, sometimes victors, often vanquished. They united with both Hannibal and Hamilcar against the common enemy, but in 191 B.C. they were definitely defeated by Scipio Nasica, and about half their Italian lands were taken from them by the Romans. According to Strabo, some of the Boii went back across the Alps at this time and settled in the domain of their kinsmen, the Taurisci, along the Danube, near Vindelicia and Retia, there may, however, have been a settlement of the Boii on the Danube, in the country now called Bohemia, long before. About 130 years later the Germanic peoples pressed into these northern abodes of the Boii, who were unable to resist them. A fragment of the tribe joined the Helvetians in their migration into Gaul and were met and defeated by Cæsar, who settled them in the land of the Ædui. The country of the Boii, to the north of the Danube, after it had been overrun by the Marcomanni (q.v.), was still called Boiohemum, the land of the Boii, the modern Bohemia. Another survival of the name is Bavaria. Consult T. R. Holmes, *Cæsar's Conquest of Gaul* (2d ed., Oxford, 1911).

BOIL (allied to Lat. *bullā*, a bubble), or **FURUNCLE** (Lat. *furunculus*). An acute circumscribed suppurative inflammation of the skin and subcutaneous tissue. It begins as a small hard point of a dusky-red color, which is hot, painful, and throbbing. This point extends, and during several days these symptoms increase in severity until finally the boil ceases to enlarge. It is then of a conical form, with a broad, firm base, and presents on the apex a whitish blister, which contains a little pus. This opens, and after a few days more there is discharged a core or slough of cellular tissue, and the small cavity left heals rapidly, leaving a white depressed scar. Boils are common in the spring and in young and plethoric persons, and their appearance is not inconsistent with robust health. Men somewhat overtrained for athletic contests, and others who have suddenly changed their diet and daily habits, are subject to them. In some, boils continue to succeed each other for a length of time. In the treatment of boils the intestinal canal should be cleared out by laxative medicines, and one of the so-called "alteratives," of which calomel is reputed best, given for a few weeks. Of late years staphylococcus vaccines have been used with excellent effects. The skin should be kept healthy by frequent washing, while the inflamed spots should be poulticed with flaxseed combined with an antiseptic, to avoid infection of neighboring parts. Deep incision after pus appears is the best and most satisfactory treatment. The cause of boils is infection with a pus germ, generally the staphylococcus, which enters a hair follicle or a sweat gland. See **ABSCESS**.

Aleppo Button or Aleppo Boil.—An endemic disease of hot countries, consisting of a scab or an ulcer which attacks the face chiefly. It is also called *Bishia button*, *Gafsa button*, *Kandahar sore*, *Natal sore*, *Dellin boil*, and *Oriental boil*. It is found in the countries bordering the southern and eastern shores of the Mediterranean Sea, in Crete, Cyprus, the Crimea, and Persia. It was first described by Russell in

1756. Duclaux claimed that it is caused by a diplococcus. Wright, in 1904, found protozoa 1μ or 2μ in diameter, in the blood. He suggests the name *Helcosoma tropicum*.

In the course of the disease a red spot appears, which soon becomes a papule (pimple), then a nodule, which breaks down into an ulcer, over which a scab forms. The period of incubation is from three days to several months. The disease is not constitutional. Usually there is but one boil, but there may be as many as 90 on the face and body (Crocker). The disease runs a course of 6 to 12 months, and hence the Persians call it "the one-year boil." Distorting cicatrices result. It is most common in young children. The best treatment is to scrape the surface with a sharp spoon and cauterize with nitric or carbolic acid.

BOIL, *Span. pron* bó-il', **BOYLE**, or **BULL**, **BERNARDO** (?-1520). A Spanish Benedictine friar of the monastery of Montserrat, Catalonia, and the first priest to visit the New World. Under papal appointment (1493) as apostolic vicar of the Indies, he accompanied Columbus on the admiral's second voyage (1493-94). He was attended by three other friars, and on Epiphany Sunday (Jan. 6), 1494, said the first mass celebrated in America. He was one of the four commissioners selected to govern the colony of Isabella during the absence of Columbus on a voyage of further discovery (April 24 to Sept. 20, 1494). Already, it would appear, jealous of the admiral, he now turned traitor, and with Margarit and others similarly disloyal sailed for Spain, there to spread every sort of misstatement against his commander.

BOILEAU-DESPRÉAUX, bwd/dô/dâ/'piô/ô', **NICHOLAS** (1636-1711). The most distinguished of French critics in the age of Louis XIV, known as the "legislator of Parnassus." He was in criticism an incarnation of correct, commonplace common sense, a schoolmaster in careful workmanship, sworn enemy of all false sentiment and preciosity, such as marred the poetry and fiction of his immediate predecessors. He was born in Paris, Nov. 1, 1636, studied first for the priesthood, then for the law, but found his place instinctively in the rather Bohemian literary company of Molière, La Fontaine, Racine, the philologist and realistic novelist Furetière, and the witty Ninon de l'Enclos. Of the Hôtel Rambouillet and its literary coterie he made one trial and never another. Louis XIV liked his rare honesty and gave him a pension, but he shunned the court, save when he could serve a friend there (e.g., Corneille), for he was a bourgeois and not at ease with the aristocracy. Feeble, asthmatic, in later life a little deaf, poetry was his aspiration, and criticism, justly weighed and carefully balanced, his delight. His life was uneventful. He never left Paris and its environs save at the command of the King, who made him a royal historiographer, and he died at Auteuil, March 13, 1711. His satire on the vices of Paris was his first success and by its date gave a name to the "school of 1680." Seven other satires appeared in 1669, and five more complete the list. They are in rhymed couplets, polished, harmonious, witty, with the maliciousness of merciless personalities. This was destructive criticism with a vengeance.

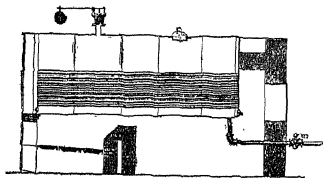
In the *Art poétique* (1674) he was constructive, and, following Horace's *Ars Poetica*, gave

a theory of poetic composition in four cantos, of which the first lays down general rules, the second applies these to lyric poetry, the third to the epic and the drama, while the fourth contains general reflections, advice, and cautions, all spiced with brilliant wit and barbed with personal allusion. He preached a reign of literary law, truth in subject, conscientious workmanship in form, unity, clearness, proportion. He sought to establish literature on an unchanging foundation and to give canons of classicism for the ages. And indeed his work has a perennial reasonableness, though it allows scant scope for "the heat and height of sane emotion" and the unchartered play of genius. For Boileau's mind was material, logical, lacking in imagination. He has been studied by generations because his is the art that can be learned, as Pope, his best pupil, learned it, though his own Horace might have taught him that the true poet could not be made. Boileau repeated and enforced his critical views in the prose *Dialogue des héros de roman*, whose authorship he at first concealed, and in *Réflexions critiques sur Longin* (1693). His own best verses are 12 *Épîtres* and a mock-heroic epic, *Le Lutrin*, which was his most popular work. It was published in part in 1673, but not in full till after his death. This and all the poems are filled with cleverly turned lines that remain as familiar quotations, but Boileau should be most gratefully remembered as the first systematic critic of France, the first to make criticism an art. See CRITICISM.

He was narrow and sometimes unjust, he never fully grasped the fundamental principles of the classic art he admired; but his honest, loyal, stubborn, rough good sense did much to direct the talent of Molière, Racine, and La Fontaine to its most fruitful channels and to guide the next generation to a true, though partial, naturalism. On the lyric poetry of succeeding generations its effect was to cultivate a formal technique and so to check inspiration that first fully revives in the Romantic school. The best edition of Boileau's *Works* is by Gidel (4 vols., 1870-73); the *Œuvres de Boileau* (Strassburg and New York, 1909-) may also be mentioned. Consult: Deschanel, *Le romantisme des classiques* (4th series, Paris, 1888); Lanson, *Boileau* (Paris, 1892); Morillot, *Boileau* (Paris, 1892); Faguet, *XVII siècle, études littéraires* (Paris, 1887); Liénon, *Cours de littérature* (Paris, 1889-95); Dreyfus-Brisac, *Un fauve classique: Boileau* (Paris, 1901), and Walter, *Boileau's Wirkung auf seine englischen Zeitgenossen* (Strassburg, 1911).

BOILER. In steam engineering, a vessel in which steam is generated for heating or power purposes. In its simplest form, it consists of a closed vessel made of sheet metal, having apertures for the admission of water and egress of steam, with gauges for showing the level of the water and the pressure of the steam, and set or mounted in combination with a furnace, either internal or external, according to the type of boiler. When water is boiled in an open vessel, the temperature of the water and of the steam rising from it remains at, or very near, 212° F., and the tension or pressure of the steam is no more than sufficient for it to make its way into the atmosphere, being equal to that exerted in all directions by the atmosphere itself, viz., 14.7 pounds per square inch. In a closed vessel, on the other hand, the temperature and pressure

to which steam can be raised are limited only by the strength of the vessel or boiler. The form of a boiler is determined by two considerations—viz., strength to withstand internal pressure, and efficiency in producing steam; and the object of the designer is to combine in one apparatus sufficient strength to work at the proposed pressure with a large margin or factor of safety, and to occupy the least possible space, with such a form and arrangement as shall abstract the maximum of heat from the gases of combustion and at the same time be in all respects suitable to the special circumstances of the case. The spherical form is that best adapted for strength and was the earliest to be used, being employed by Hero of Alexandria about 150 B.C. in his reaction engine, which was known as an *æolipile*. The boiler was hemispherical and was mounted on a stand and heated by a wood fire below. The spherical form of boiler presents to the fire, however, the



HORIZONTAL RETURN TUBULAR BOILER.

This type of boiler is in very general use for low pressure in manufacturing purposes.

minimum heating surface in proportion to its contents and therefore has a minimum efficiency. After spherical boilers came rectangular steam generators with rectangular fire boxes of so many types and forms that it is impossible to allude to them in detail. These square boilers were not suitable for carrying a greater pressure than three or four pounds to the square inch, but were used in the early days of steam vessels. Their defects led to cylindrical boilers, at first set vertically and afterward horizontally, and later on these were furnished with internal furnaces. Watt's "wagon-top boiler" (so called from its shape) was used for many years, but, being unfit for any but the lowest pressures, it was discarded; and the "egg-end" boiler, or plain cylinder with hemispherical ends, also much used at one time, has now disappeared on account of its small evaporative efficiency, it being used only where large quantities of waste fuel material, such as sawdust, can be had cheaply.

Modern steam boilers, speaking broadly, may be classified according to their form and construction or according to the character of their employment. Under the first division we have horizontal and vertical boilers, internally and externally fired boilers, shell and sectional boilers, fire-tube and water-tube boilers, or boilers combining two or more of these several features. Under the second division are included stationary boilers, locomotive boilers, marine boilers, and various forms of portable or semiportable boilers. The variety of forms and methods of construction of stationary boilers is very great, but the locomotive boiler is practically limited

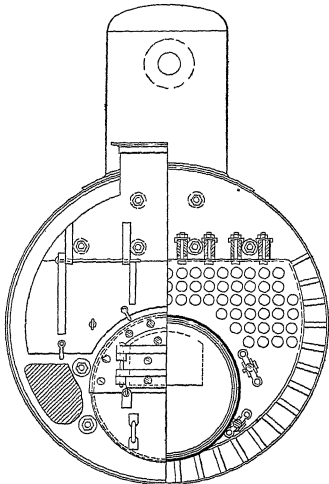
to a single form, and marine boilers are usually of the type known as the Scotch boiler, although water-tube boilers of various forms are being more and more used. Recently considerable attention was devoted to the development of a boiler for motor vehicles. For this purpose use is made of one of the oldest types of steam generators, the "flash boiler," so called from the fact that no body of water is carried in it, but the water needed to make steam is injected by a pump, and thrown directly against highly heated tubes or coils, when it at once flashes into steam, it is a very light generator, but has the disadvantage in its unimproved form of requiring renewal of the heated surfaces frequently, because, by constant exposure to high temperatures, the metal oxidizes rapidly and scales off, reducing the tubes so much that they must be replaced. The White Company's semi-flash boiler had a coil construction with a mechanical feed or circulation of water, so designed that the cooler water entered the coil at the top, and the hot (and superheated) steam left at the bottom, where the coil was practically red hot over the fire. Hence rapid changes of temperature in the heating coil were eliminated, and a long life secured for the coil.

The most familiar form of boiler is, perhaps, the return tubular boiler. It has a cylindrical shell closed at the ends by flat circular plates, and tubes extending lengthwise of the boiler and terminating in the end plates. These tubes are open at both ends, and through them pass the gases of combustion. The furnace is placed underneath the front end of the boiler shell, and from it the gases pass back under the shell to its rear end, thence up and forward through the tubes to the front end, and thence out of the chimney. In this passage the hot gases give up a large portion of their heat to the water surrounding the tubes inside of the shell. Technically classified, this boiler is a horizontal, externally fired, fire-tube shell boiler. Another form of horizontal shell boiler formerly much used has the numerous fire tubes replaced by two large cylindrical flues. This type of boiler is less efficient than the tubular boiler, but its greater simplicity and its accessibility for cleaning give it advantages, especially where the feed water is bad. The two-flue or Lancashire boiler has several modifications which are known by special names. The Galloway boiler has two flues which are crossed at intervals by conical-shaped tubes whose purpose is to provide an internal bracing for the flues and to add to the heating surface. In this boiler the grates are placed inside the flues at the front. The double Cornish boiler has two furnaces, internal and side by side. These flues are usually corrugated to give them strength against collapse from external pressure. Older forms were stiffened by rings of angle or tee iron, as in the Adamson construction. The Cornish boiler has one large instead of two smaller flues. Both the Galloway and Cornish boilers are internally fired.

Vertical boilers consist of a cylindrical shell set on end, with the grate at the bottom and fire tubes running vertically. In large stationary boilers of this type the boiler is mounted on a masonry foundation, but in small portable boilers, such as are commonly used for hoisting engines, the boiler is set on a cast-iron base which contains the grate and ash pit complete. Some of the larger stationary vertical boilers

built at present are from 20 feet to 30 feet high. Fire-engine boilers are always of the vertical type. See FIRE ENGINES.

The Scotch marine boiler has a cylindrical shell resembling a large drum in shape. It is set horizontally. In the lower half of the boiler there are from one to four flues containing furnaces, which terminate in a combustion chamber at the rear, and in the upper part there are a large number of fire tubes terminating in the combustion chamber and in the uptake to the smokestack at the front. Double-ended boilers of

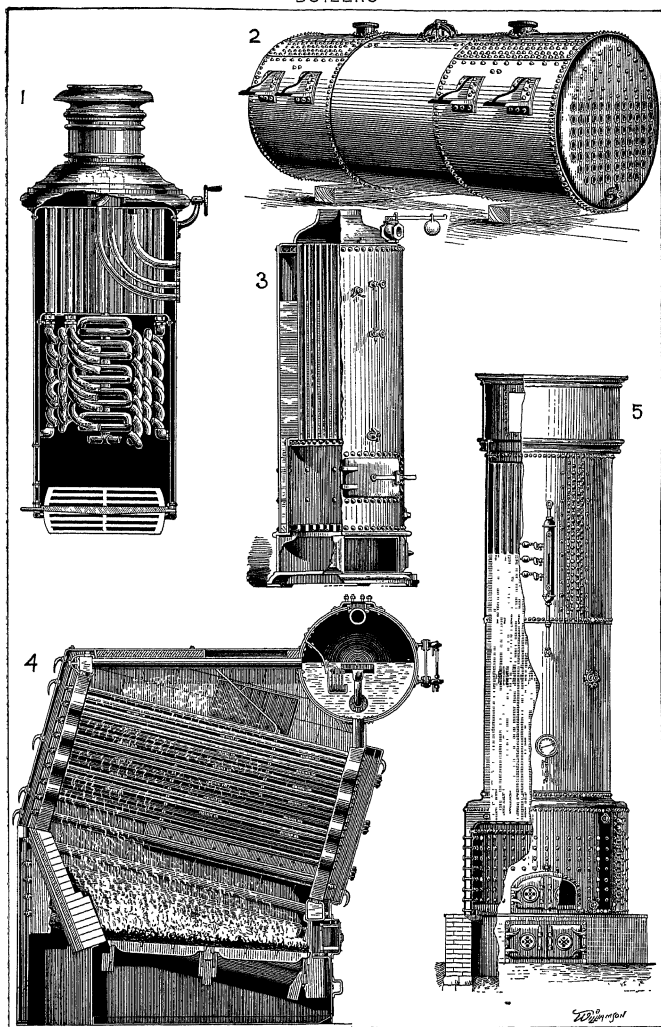


SCOTCH MARINE BOILER, FRONT END

this type have furnaces at each end, and resemble two single-ended boilers placed back to back. Sometimes a common combustion chamber is used for both sets of furnaces in a double-ended Scotch boiler, but it is considered better practice to have a separate combustion chamber for each set of furnaces. The locomotive boiler consists essentially of a rectangular fire box and a cylindrical barrel through which numerous fire tubes extend from the fire box to the smoke box. The latter forms a continuation of the shell from which the products of combustion pass up the smokestack. Although this form of boiler is universally used for locomotives, it has many disadvantages, chief among which are the necessity for numerous stays to hold the flat plates around the fire box in shape against the external pressure which tends to collapse them, and the troubles from unequal expansion of the hotter and cooler parts of the inner and outer plates. (See illustration under LOCOMOTIVE.) Newer constructions corrugate these formerly flat surfaces, and thus give strength without the same troubles from failure of stay bolts.

All the boilers so far described have been of the fire-tube type—i. e., the tubes and flues pass-

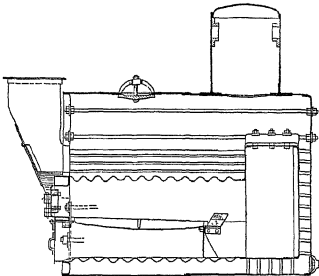
BOILERS



1. BOILER FOR CLAPP AND JONES FIRE ENGINE.
2. HORIZONTAL FIRE-TUBE BOILER.
3. VERTICAL FIRE-TUBE BOILER.

4. BABCOCK AND WILCOX MARINE WATER-TUBE BOILER.
5. MANNING VERTICAL FIRE-TUBE BOILER.

ing through the boiler shell have been for the conveyance of hot gases from the furnace. The idea of using tubes and flues is to provide a greater heating surface and generate steam more rapidly. To economize heat and increase the rapidity of raising steam still further, the water-tube boiler has been developed and is now being extensively used. In water-tube boilers there are one or more drums or water legs connected by tubes of relatively small diameter.



SCOTCH MARINE BOILER, LONGITUDINAL SECTION.

These are filled with water, and the gases from the furnace pass around and between the tubes and so heat the water contained within them. The tubes connecting these drums vary from straight tubes to tubes bent to various degrees of curvature and vary in diameter from 1 inch to 4 inches. Water-tube boilers are made light, powerful, and compact, and well adapted for forced draught, steam can be raised rapidly from cold water or a sudden demand for increased pressure quickly met. They have the most effective and definite circulation of the water within them. They are the safest of all types against rupture and explosion, as the failure of one unit releases the excess of pressure gradually and without concussion. For these reasons they are largely used on war vessels, especially torpedo boats, though many vessels in the merchant marine continue to employ the Scotch boiler. Injury may be done by the hot water which escapes at high velocity and temperature, scalding and making steam as it expands. The water-tube boiler is also extensively employed in large power-generating plants on land. See STEAM NAVIGATION.

Boiler settings are the supports of masonry or metal upon which the boiler rests and by which it is oftentimes wholly or partly inclosed. Large stationary boilers usually have masonry settings, while portable and semiportable boilers have settings of cast iron. Marine boilers are seated on plates and saddles, which are built into the bottom of the ship. In externally fired boilers the setting usually contains the furnace. (See FURNACE.) Boiler fittings or accessories comprise steam pipes and blow-off pipes, safety, check, and gate valves for various purposes (see VALVE); dampers and regulators; feed pumps and feed-water heaters; steam traps and steam separators, and steam gauges and water gauges, besides a number of minor attachments for one purpose or another in the operation of the boiler.

The water supplied to a boiler to be made into steam gives trouble within it when it carries mineral matter in a soluble form which is precipitated or concentrated on the boiling process. The steam goes off without such mineral contents; and these are precipitated or left behind and by their accumulation retard the making of steam and endanger an overheating of the plates.

The material chiefly employed in the manufacture of boilers is steel. In order to make certain that the material used has the proper strength and toughness, it is required that the plates be tested by cutting off small pieces and breaking them in a testing machine (see TESTING MACHINE) previous to use. After passing the tests the plates, which are shipped to the boiler shop flat and of various sizes, are sheared to the proper dimensions, the edges are planed, flanged, drilled for riveting, and bent by means of heavy rolls to the proper curve. The next step is to assemble the different parts and bolt them together. They are then riveted and the seams caulked. Finally, when the boiler is complete, it is tested by filling it with water under pressure, which determines whether it has the proper strength to carry the steam pressure and whether there are any leaks. Very often a boiler is tested, after it has been installed ready for operation, to determine its economy and efficiency in generating steam. Rules for such tests can be found in vol. xxi, *Trans. of American Society of Mechanical Engineers*. It is the usual practice to rate and sell boilers by the horse power, this custom having originated early in the days of the steam engine. The term "horse power," as applied to a steam boiler, has a purely arbitrary significance, since the power from the steam is developed in the engine, and hence the economy in the use of the steam depends on the engine to some extent. The rule established by the American Society of Mechanical Engineers is to consider 30 pounds of water evaporated per hour from a temperature of 100° F. under a pressure of 70 pounds by the gauge as equivalent to one horse power. This rule may be otherwise stated as a capacity for "the evaporation of 34.5 pounds of water per hour from feed-water temperature of 212° F. into dry steam of the same temperature." See HORSE POWER.

Boiler explosions may occur from various causes, but the most frequent is that the boiler is too weak to endure the regular working pressure. A new boiler may be weak through defective design or workmanship, and an old boiler is liable to be weak through rust and general deterioration. Sometimes, but rarely, the sheets which resist pressure fail by a pressure above the working pressure. Low water is often an indirect cause of an explosion, when the sudden injection of water upon an overheated area of the heating surface entails such a sudden contraction of the metal locally as to cause an overstrain, under which the sheet fails. The spectacular and destructive features of a boiler explosion follow when the hot water confined at high pressure and temperature is released by an adequate rupture. The lowered pressure permits the highly heated water to pass into gas with a suddenness and a disruptive energy which tears the remaining structure apart and may propel parts of it to a distance through walls and structures surrounding it. The water gasifies in a manner analogous to an explosion of powder. The safety of a boiler from explosion is insured only

by careful and correct design, honest and thorough workmanship, intelligent care in service, and incessant vigilance by expert inspection. Boilers are usually insured against failure in companies making a specialty of such inspection, and their underwriting. See STEAM ENGINE.

Bibliography. The literature on boilers is very extensive, and students have the choice of a number of standard books treating of the history, design, and construction of such apparatus. The following works will be found to cover the subject thoroughly: Thurston, *A Manual of the Steam Boiler* (New York, 1896), Bair, *Boilers and Furnaces* (Philadelphia, 1899), Bertin, *Marine Boilers* (London, 1898), Parsons, *Steam Boilers* (New York, 1904), Kent, *Steam Boiler Economy* (New York, 1901), Hutton, *Mechanical Engineering of Power Plants* (New York, 1908), Kent, *Steam-boiler Economy* (New York, 1910), Gray, *Practical Design of Marine Single-Ended and Double-Ended Boilers* (London, 1912), Shealy, *Steam Boilers* (New York, 1912). American and European technical journals should also be consulted for the more recent developments in boiler construction.

BOILING See COOKERY

BOILING POINT. The temperature at which a liquid substance boils. Evaporation of water takes place, more or less rapidly, at all temperatures (even at temperatures at which it rapidly freezes), no matter how great the pressure of air or other gases on its surface. When some water is placed in an empty closed vessel, evaporation will go on until the escaping vapor has attained a certain definite pressure of its own, whose magnitude is dependent on nothing but the temperature of the water, this is the *vapor pressure* of water at the given temperature. If the vessel in which the water is placed contains air, the latter exerts a certain *mechanical pressure* upon the water, and the resulting compression of the liquid into a smaller volume causes some rise in its vapor pressure. However, the compressibility of liquids being generally slight, the rise in the vapor pressure of, say, water due to mechanical compression by atmospheric air is practically negligible. In other words, the presence or absence of air in the containing vessel will be found to have practically no influence upon the limit to which a liquid will vaporize within it. Not so, however, as regards the speed with which that limit is attained. The presence of air checks the rate of evaporation, though it cannot prevent the latter from going on until the vapor pressure has finally attained its limit determined by the temperature.

While the presence of air thus diminishes the rate of evaporation, an elevation of temperature causes, on the contrary, a corresponding increase of that rate. As the temperature of the water rises, its vapor pressure continuously increases, and with it increases the rate of evaporation. Finally, when the temperature has risen to the point at which the vapor tension is equal to the external pressure of the air, evaporation becomes very rapid indeed, and bubbles of water form in brisk succession throughout the volume of the liquid, throwing it into more or less violent commotion, the water is then said to be *boiling*. If the steam is now allowed to escape, boiling will go on until all the water has been evaporated, and if, while the liquid is boiling, the bulb of a mercury thermometer be kept just below the surface of the

water, the thermometer will register a constant temperature (provided the water is pure). This constant temperature, the lowest at which, under a given pressure, water will continue to boil, is called the boiling point of water at that pressure.

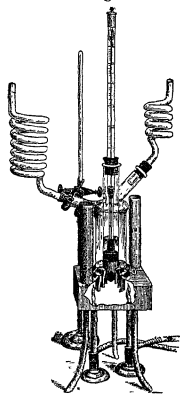
The so-called normal boiling point of water is 100° Centigrade (212° F). This is the temperature at which water boils under normal atmospheric pressure, i.e., when the height of the mercury barometer is exactly 760 millimeters (30 inches). A change of pressure will at once result in a corresponding change of the boiling temperature. In elevated positions, where the atmosphere is rare and the barometric pressure comparatively low, the boiling point is lower than at the level of the sea. At the city of Mexico, 7000 feet above the sea, water boils at 93.3° C (200° F), at certain points in the Himalayas it boils at 82.2° C (180° F). Boiling water is thus not always equally hot, and in elevated places many substances cannot be cooked by boiling. Once the boiling temperatures of water corresponding to different heights have been ascertained, we can, conversely, determine the height of a mountain by observing the boiling point of water at its summit. See HYPSOMETER.

The above statements as to the boiling point of water are true only of water which is chemically pure and contains no admixture of any sort. If, instead, we take a solution, say, of ordinary salt, we shall find (1) that when heated under normal atmospheric pressure, the solution will begin to boil at some temperature higher than 100° C, and (2) that, whatever the temperature at which boiling will begin, if the steam is allowed to escape, the temperature of the boiling solution will continuously rise, in other words, the solution will not continue boiling at a constant temperature. When the "boiling point of a solution" is spoken of, it should be understood to mean the degree of heat at which boiling just commences. The only reason that a solution will not boil at constant temperature lies in the fact that, during the process of boiling, its composition changes, for when a solution boils, water escapes in the form of steam, while the solid substance remains behind and its proportionate amount in the solution consequently increases. If, however, the steam is continually condensed by means of a suitable cooler, and thus made to return to the solution, the composition of the latter will remain unchanged, and no matter how long boiling is kept up, the temperature will remain constant, this temperature is evidently the point at which otherwise, if the steam were allowed to escape, boiling would just commence.

From what has been said of boiling solutions, it may be seen that the boiling point of a liquid is the higher, the greater the amount of non-volatile foreign substance contained in it.

This is, however, not the only factor on which the temperature of a boiling solution depends. The molecular weight of the dissolved substance is another factor. If we were to take two equal quantities, say, of water, heat them to boiling, and then add to them, respectively, equal weights of two different substances, we should find that the elevation of temperature is greater in the case of the sample to which we have added the substance of smaller *molecular weight*. Experiments carried out in this manner with

many different substances permit us to induce the law, that the difference of the boiling temperatures of a solution and of the pure solvent is inversely proportional to the molecular weight of the substance dissolved. It must, however, be borne in mind that in this simple form the law is limited to solutions which do not conduct electricity, in solutions of electrolytes relations are not quite so simple. (See SOLUTION, DISSOCIATION.) In the case of solutions of nonelectrolytes, such as many of the carbon compounds, the law holds with considerable precision; and it has proved especially useful in this, that it permits us to determine the unknown molecular weights of newly discovered substances. To ascertain, by this method, the molecular weight of a new substance, all the



BECKMANN'S APPARATUS.

chemist has to do is first to observe the rise of temperature produced in a boiling solvent, when a certain quantity of his substance is added to it, and then to compare the rise of boiling point to the rise produced by the same quantity of some other substance, of known molecular weight. These important determinations are carried out with considerable precision by the use of Beckmann's apparatus (see figure).

The apparatus consists essentially of two parts: an inner tube, *a*, containing the solution, and an outer vessel, *b*, containing the pure solvent and separated from *a* near the bottom by a sheet of asbestos. The coolers *c* and *d* serve to condense the escaping vapors. To determine the rise of boiling point caused by a given substance, the operator introduces into *a* first a known amount of the pure solvent, observes the boiling point, then introduces also a known small amount of his substance, and again observes the boiling point. In the case of most solvents the inner tube need not be heated directly, and heating only the outer vessel is sufficient to keep the liquid in the inner tube boiling.

What has been said above of pure boiling water applies equally well to any other compound in the liquid state; any liquid consisting of one single chemical compound has a definite boiling point depending on nothing but the external pressure. Thus, under normal atmospheric pressure, the boiling point of ether is 35° C.; the normal boiling point of pure alcohol is 78.3°; aniline boils at 183°, and the hydrocarbon piceine at 520°. The boiling temperature is, of course, very easy to determine, and since it is one of the highly characteristic properties of a liquid, a chemist determines that point usually before inquiring into other properties when called upon to identify a liquid compound. Further, since in the case of a pure chemical

compound, if the vapors are allowed to escape, the boiling temperature remains constant, while in the case of a solution (or any other homogeneous liquid mixture) it continuously rises; whenever a chemist wants to ascertain whether he is dealing with a single and pure chemical compound, he subjects his liquid to distillation, to see whether the boiling point will remain constant. If it does not remain constant he knows that he is dealing with a mixture or that some chemical change is taking place in the liquid. See CHEMISTRY.

From the fact that every compound has a characteristic boiling point of its own, chemists were naturally led to think. (1) that some definite relation must surely exist between the chemical nature of compounds and their boiling points, and hence (2) that, in comparing compounds of similar constitution, definite numerical relations should be expected to exist between the boiling points of such compounds. As a matter of fact, in the homologous series of organic chemistry, the boiling point is generally found to increase with the complexity of the molecule (see, for example, the article HYDROCARBONS); which shows that the boiling point of compounds is really dependent on their nature and structure. The numerical relations hitherto discovered are, however, far from being definite and general. Probably we do not know as yet how to search for the more definite relations. Consult Jones, *The Freezing-Point, Boiling-Point, and Conductivity Methods* (Easton, Pa., 1912).

BOILLY, bwā'yē, LOUIS LÉOPOLD (1761-1845). A French genre and portrait painter. He was born at La Bassée (Nord), the son of a sculptor. Excepting his father, none of his teachers are known; but he was much influenced by the Dutch genre painters. He is known as the "Little Master of the Revolution"—not however of its stirring military, but its peaceful, domestic scenes. His pictures are small in size, firm and accurate in design, even in color, and sparkling with wit and grace. Possessed of amazing facility, he has been credited with no less than 5000 pictures. Many of them were engraved, and he himself did creditable lithographing. Most of his paintings are in private possession, the Chaix d'Est Ange Collection (Paris) being the richest. Many are in French provincial museums, and the Louvre has "The Arrival of the Diligence" (1803). The authoritative monograph on Boilly is by Harisse (Paris, 1898).

BOIS D'ARC, bwā'dark'. See OSAGE ORANGE. **BOIS DE BOULOGNE**, bwā de bwō'lō'ny'. A famous and beautiful park of Paris covering about 2250 acres (Map: Paris). It derives its name from the town of Boulogne-sur-Seine on its south. The park was formed under Napoleon I out of the old Forêt de Rouvray, and remained in the possession of the state until transferred to the city by Napoleon III in 1852, since which time it has been the favorite drive of Parisians. The Bois was greatly injured by bombardment during the siege of Paris in 1870-71, but was soon restored. It contains the great Auteuil and Longchamps race courses. The Parisian season closes the races for the *Grand Prix* of Longchamps (100,000 francs), held in the early part of June. The Bois also contains the Jardin d'Acclimatation. See PARIS.

BOIS DE CHYPRE, bwā de shē'pr'. See ELM.

BOISDEFRE, bwa/défr', RAOUL FRANÇOIS CHARLES LE MOUTON DE (1839-) A French soldier, born at Alençon (Orne). He studied at the College of Saint-Cyr and at the Staff-College. During the Franco-Prussian War he was a major of cavalry and aid-de-camp of General Chanzy and in 1882 was promoted to be colonel. In 1890 he became assistant chief of staff and in 1893 chief of staff. At the trial of Emile Zola (1898), during the Dreyfus agitation, he appeared full-uniformed in court, and in a much-applauded address to the jury affirmed the existence of a third secret document incriminating the accused officer. When subsequently it transpired, through the confession of Lieutenant Colonel Henry, that the document to which he had referred in good faith was a forgery, he tendered his resignation.

BOIS DE VINCENNES, vā'n'sen' A park of 2250 acres east of Paris, formerly a hunting forest of Louis IX. A large part of the park is taken up by the Champ de Manœuvres, an infantry drill ground, a race course, and the polygone d'artillerie. It is equal to the Bois de Boulogne in beauty, but is not so fashionable.

BOISE, boy'se A city and the county seat of Ada County, and the capital of the State of Idaho, 435 miles northwest of Salt Lake City, Utah, on the Boise River, and on the Oregon Short Line Railway (Map Idaho, B 6). It is the centre of an agricultural and mining district and has important lumber, dairying, meat packing, stone quarrying, bottling, and stock raising interests. It also manufactures cigars, cement pipe, ice, brooms, trunks, candy, doors and sashes, harness, etc., and is one of the most important inland wool markets in the United States. Water derived from the Boise River—on which, 26 miles above the city, is situated the celebrated Arrow Rock Dam, one of the highest in the world (354 feet)—is utilized for irrigation and also for power in the manufacturing industries. Natural hot water exists here in abundance and is extensively used in heating the buildings of the city. Among the prominent features are the largest enclosed natatorium in the United States, fed by natural hot water, a Carnegie library, a number of fine schools and academies, business colleges, United States assay office, land office, surveyor general's office, reclamation and forestry service headquarters, and military post, the State capitol, the penitentiary, and a Soldiers' Home. The city also contains two hospitals, several good hotels, three theatres, and a popular amusement park called "The White City." Boise was settled in 1863 by Major Lugabill, U. S. A., who established here a military post known as Fort Boise. In 1864 it was organized as a city and became the capital of the Territory. Boise has adopted the commission form of government. Pop., 1900, 5957, 1910, 17,358.

BOISE, boyz, JAMES ROBINSON (1815-95). An American educator. He was born at Blandford, Mass., and in 1840 graduated at Brown University, where he was professor of Greek from 1843 to 1850. From 1852 to 1868 he was professor of Greek language and literature at the University of Michigan and from 1868 until his death filled a similar chair at the University of Chicago. During the latter period he was also professor of New Testament interpretation at the Baptist Union Theological Seminary (1877-95), and professor emeritus of New Testament Greek at the University of Chicago. He pub-

lished notes on the Epistles to the Galatians, Romans, Ephesians, Colossians, and Philippians and also the classical text-books, *Exercises in Greek Prose Composition* (1850), *First Lessons in Greek* (1870, 8th ed., 1876), *Selections from Various Greek Authors* (7th ed., 1889).

BOISE, OTIS BARDWELL (1844-1912). An American musician and composer. He was born at Oberlin, Ohio, studied music in Leipzig and Berlin, and for some time was instructor in composition at the New York Conservatory and organist of the Fifth Avenue Presbyterian Church. From 1881 to 1888 he was in business in New York. In 1890 he took up his residence in Berlin, where he was in great demand as a teacher of composition. He returned to America in 1908 as professor of composition at the Peabody Conservatory in Baltimore. His compositions include a *Concertstück* for piano and orchestra, a G minor piano concerto, a symphony, and two concert overtures. He has also written *Harmony Made Practical* (1900) and *Music and its Masters* (1901).

BOISGOBEY, bwō'gā-bā', FORTUNÉ CASTILLE DU (1821-91). A French writer of detective stories whose work may be compared, not unfavorably, with that of Emile Gaboriau. He traveled extensively and not unprofitably, for he appears to have made his experience serve his writing. He was born at Granville (Manche) Sept. 11, 1824. He was paymaster in the French army in Africa from 1844 to 1848. Later he traveled in the Orient and collected his memoirs of the voyage under the title *Du Rhin au Nil* (1876). He made his first literary appearance in the *Petit Journal* with a novel entitled *Deux Comédiens* (1868). He then became a popular feuilleton writer. *Le Colonel Forçat* (1872) and other police stories, many of which have been translated into English, later afforded some suggestions to Sir A. Conan Doyle. Other works of his are: *Les gendres* (1873), *Chevalier Casse Cou* (1873), *La tresse blonde* (1874), *L'as de cœur* (1875), *Les collets noirs*, *Le coup de ponce*, *Les mystères du nouveau Paris* (3 vols., 1876), *Le demi-monde sous la Terreur* (1877), *Qui était-ce?*, *L'homme au masque de fer*, reprinted as *Les deux Mèdes de M. de Saint-Mars* (1878), *L'Épingle Rose* (1879), *Les coquelottes de Marie Rose*, *Où est Zénobie?* (1880), *Le pape de Paris*, *Les mœurs de Constantinople* (1882), *Le collier d'acier*, *Bouche cousue* (1883), *Le billet rouge* (1884), *Le cri du sang* (1885), *Le ponce croché* (1885), *La violette bleue* (1885), *La bande rouge* (1886), and *La main froide* (1889).

BOISGUILLEBERT, bwa'gā'ye-bēr', PIERRE LE PESANT, SIEUR DE (1646-1714). A French political economist, born in Rouen. In 1690 he was appointed lieutenant general (civil) of his bailiwick. He published in 1695 *Le détail de la France sous le règne de Louis XIV.*, and by a work entitled *Faustum de la France* (1706) brought upon himself the wrath of the ministry and exile to Auvergne. He republished the two essays, somewhat amplified, under the title *Détail de la France*, in 1712. Boisguillebert was the first economist to criticize the prevailing mercantile system of economic policy on the ground that it confused gold and silver with national wealth. In his view the real national wealth consists in commodities that supply the necessary wants of life. He attacked the system of Colbert on the ground that it exaggerated the importance of industry and permitted agriculture, the sound

basis of national life, to fall into decay. In his emphasis upon the importance of fair prices for the products of agriculture, and of unrestricted trade in such products, Boisguillebert anticipated the chief doctrines of the physiocrats (q.v.).

BOIS-LE-DUC, bwā'le-duk' (Dutch *s' Hertogenbosch*, Duke's Forest). The capital of the Dutch province of North Brabant, and seat of a Catholic bishop, situated at the junction of the Dommel and the Aa (Map: Netherlands, D 3). Its fortifications were destroyed in 1876, but the natural situation of the town is very strong, as the surrounding country can be flooded, leaving only two roads passable. It is clean and well built, is about 5 miles in circumference, is intersected by canals, and has a citadel called Papenbril. The cathedral of St. John, dating from the eleventh century, is noteworthy, and the town contains the museum of the province with a collection of Roman and mediæval remains, an academy of arts, a grammar school, several hospitals, etc. Manufactures consist of gold and silver articles, shoes, woodenware, cigars, and mirrors. Its trade with the interior and its shipping are considerable. Its population in 1905 numbered 34,093; in 1910, 35,214. Bois-le-Duc is a place of considerable antiquity, having been founded in 1184 by Godfrey III, Duke of Brabant. The surrounding forest was cut down by his son and successor, Henry, who strengthened the town with walls. In the sixteenth century Bois-le-Duc separated from the Dutch states, and was ineffectually besieged in 1601 and 1603 by Prince Maurice of Nassau, but had to surrender to a Dutch force in 1620. In 1794 the town was taken by the French and in 1814 retaken by the Prussians. Consult Fremant, "The Siege of Bois-le-Duc," in *The Military Engineer* (London, 1759).

BOISSERÉE, bwā'srā', SULPIS (1783-1854) and MELCHIOR (1786-1851). German art critics and antiquaries. They were born at Cologne, Aug. 2, 1783, and April 23, 1786, respectively. A visit which the brothers, along with their friend Bertram, paid to Paris in 1803 inspired the trio with the idea of collecting and preserving the scattered specimens of early German painting. The realization of this idea became the single object of their lives. After years of research they had gathered at Heidelberg in 1810 a collection of nearly 200 pictures. In 1818 it was taken to Stuttgart, where the collection was arranged chronologically in a spacious building. This disclosed the fact that in the fourteenth century Germany possessed an original school of panel painting, and that it was strongly modified by the Flemish masters, especially the Van Eycks, in the fifteenth century. In 1827 the collection was sold to the King of Bavaria for 12,000 thalers and, except for about 40 which were taken to Nuremberg (now in the Germanic Museum), they were incorporated into the Royal Pinakothek in Munich, to which place the brothers Boisserée followed it. In 1845 the two brothers removed to Bonn and devoted all their energies to the study of the Cologne Cathedral, pleading for its completion. Sulpiz died May 2, 1854; Melchior, May 14, 1851. They published lithographic plates of the gallery, and Sulpiz, who widened his studies to include all German mediæval art, wrote several valuable works on Cologne Cathedral, on the architecture of the Rhineland, etc. Their collection became a valu-

able source for the study of primitive German painting. Sulpiz Boisserée had considerable influence on Goethe's studies of German art. His widow published a biography of her husband under the title *Sulpis Boisserée* (Stuttgart, 1802).

BOISSIER, bwā'gyā', MARIE LOUIS GASTON (1823-1908). A French historian and archaeologist, born in Nîmes. He studied at the Ecole Normale, and was an instructor in rhetoric from 1847 to 1857 in Nîmes, and subsequently at the Lycée Charlemagne of Paris. In 1861 he was appointed to the chair of Latin eloquence at the Collège de France, where he later was transferred to that of the history of Latin literature. In 1865 he became lecturer in Latin language and literature at the Ecole Normale. He was elected in 1876 to the French Academy, in 1886 to the Academy of Inscriptions and Belles-Lettres. In addition to extensive contributions to the reviews, he published a number of scholarly works, written in a style at once clear and distinctive, and including *Le poète Attius* (1857); *Étude sur la vie et les ouvrages de Terentius Varron* (1861); *L'Opposition sous les Césars* (1875), a picture of political degeneracy at Rome under the successors of Augustus, *La religion romaine, d'Auguste aux Antonins* (1883); *La fin du paganisme* (1891); *Cicéron et ses amis* (1892); *Promenades archéologiques: Rome et Pompéi* (1880, 1896), two reconstructions of antiquity remarkable for vividness and minute accuracy, *L'Afrique Romaine* (1901); *Tacite* (1905; Eng. trans., 1906). He resigned his chair at the Collège de France in 1906. The charm of his style, and the clearness, vividness, and accuracy of his pictures of Roman life led to the translation of several of his books into English, in which form they have been deservedly popular.

BOISSIEU, bwā'syē', JEAN JACQUES DE (1736-1810). A French etcher and painter. He was born in Lyons, where he studied painting under Lombard and Charles Frontier. The years 1761-64 he passed in Paris, associating with the engraver Wille and with Greuze, Vernet, and other painters, chiefly occupied with landscape painting. In 1764-65 he was in Italy. He then returned to Lyons and devoted himself to etching. In 1761 he was appointed a *trésorier* in the bureau of general finance. The Revolution destroyed his fortune, but through the protection of the painter Jacques Louis David he was enabled to maintain a very influential artistic activity. In an age of classic convention he never ceased to be a sincere naturalist. His paintings are careful in execution, but somewhat monotonous in color. Examples, both in landscape and genre, are in the museums of Lyons, Nantes, the Louvre, Breslau, and Berlin. His numerous drawings are scattered throughout various collections, the Louvre alone possessing 20. He practiced all mediums, but was unrivaled in wash drawings. His etchings, 140 in number, and mostly after original designs, are among the very best of his day. They excel especially in beauty of tone. Consult the historical notice on Boissieu's life and works by Dechazelle (Lyons, 1810) and A. de Boissieu (Paris, 1878).

BOISSONADE, bwā'sō'nād', GUSTAVE-ÉMILE (1825-). A French jurist, the son of Jean François Boissonade, the famous Hellenist. He was born in Vincennes. He is best known through his important mission to Japan, whither he went in 1873 to draw up the principal

codes of the modernized legal system of Japan M Boissonade is also the author of the following valuable books *Histoire des droits de l'empire* (1852), *Histoire de la réserve héréditaire* (1873)—both crowned by the Académie des Sciences Morales, *Projet révisé de code de procédure criminelle* (1882), *Projet révisé de code pénal* (1886). He was decorated with the Legion of Honor in 1881.

BOISSONADE, JEAN FRANÇOIS (1774-1857) A French classical scholar, born in Paris, Aug 12, 1774, of a noble Gascon family. He was originally intended for an administrative career and from 1792 to 1795 held public offices, but after that date devoted himself to philology. He soon made himself known to the learned world by his contributions to the philological journals and was appointed professor of Greek in the University of Paris in 1812. In 1813 he was admitted to the Academy of Inscriptions, and in 1828 he succeeded Gail as professor of Greek literature in the Collège de France. His most important works are *Philostati Heroica* (1806), *Marini Vita Procli* (1814), *Tibullus Rhetor de Figuris* (1815), *Sylloge Poetarum Graecorum* (24 vols, 1823-26), *Philostati Epistulae* (1842), *Tzetzes, Allegoriae Iliados* (1851), *Babri Fabulae* (1844). Two other works, *Anecdota Graeca* (1829-33) and *Anecdota Nova* (1844), throw much light on Byzantine history and on the Greek grammarians.

He contributed in his earlier years numerous papers on philological subjects to Parisian, English, and German journals, and gave the cause of classical study in France a powerful and still perceptible impulse by his eloquent and attractive lectures from his chair. In addition to his many and laborious works in classical philology, he also signalized himself as a French lexicographer and belle-lettrist and was one of the most copious and valued contributors to the *Biographie Universelle*. He died Sept 8, 1857.

BOISSY D'ANGLAS, bwa'sē' dan'glas', FRANÇOIS ANTOINE, COUNT (1756-1826) A French statesman, born at Saint-Jean-le-Chambre, in the department of Ardèche. In 1789 he was elected a deputy of the States-General. While a member of the Constituent Assembly, he was accused of plotting to change the French monarchy into a Protestant republic. After the execution of Robespierre, whom he helped to overthrow, he became a member of the Committee of Public Safety (1794) and proved himself a man of marked ability. He was director of the supply of provisions for Paris during the riotous and sanguinary proceedings of the 13th Germinal and 1st Prairial in the year III of the Republic and in this capacity met the popular menaces with singular firmness. Subsequently he became President of the Council of Five Hundred, was a Senator under Napoleon, and a peer under Louis XVIII. He wrote *Recherches sur la vie, les écrits et les opinions de Malesherbes* (1819) and *Études littéraires et poétiques d'un vieillard* (1825).

BOITO, bō-ē'tō, ARRIGO (1842-) An Italian composer and librettist. He was born in Padua, Feb 24, 1842. It is an anomalous fact that Boito owes his musical fame to an opera, *Mefistofele*, which has been a comparative failure, and that this work despite its apparent lack of lasting popularity, should be considered epoch-making—one of the most important Italian musical products of the nineteenth century—because it forms the pivotal point on which Ital-

ian opera turned from mere tunelessness to the new dramatic school exemplified in the later Verdi and in Ponchielli, Mascagni, Puccini, and Leoncavallo. The writing of the libretto, the composition and remodeling of this "remarkable failure" occupied Boito for nearly 20 years. The son of cultured parents—his father was an Italian painter, his mother a Polish woman, a parentage which is supposed to account for the blending of southern and northern temperament in his artistic nature—he entered the Milan Conservatory in 1856. While studying there, he composed the garden scene in *Mefistofele* and other portions of the work. But the score was not finished and rearranged for stage production until 1868. Meanwhile, Boito had done much literary work and had lived in France, Germany and Poland. *Mefistofele* was produced on March 5, 1868, at La Scala, Milan. The performance lasted six hours, and though it had several repetitions (amid scenes of disorder, due to hissing and applause, which caused the work to be withdrawn by order of the public authorities), its failure was undoubted. Boito again remodelled the opera, among other changes making Faust a tenor, instead of a barytone, role. In 1875 the revised version was produced in Bologna with great success, which was repeated in other European cities. Nevertheless, it has not maintained itself as a popular opera in the repertoire. In this country *Mefistofele* was produced at the Metropolitan Opera House, New York, in 1883, 1896, and 1901. Boito's other operas, *Ero e Leandro*, *Nerone*, and *Orestade*, have never been performed. The libretto of the first named he afterward gave to Bottesini (qv) and to Mancinelli (qv). He also wrote the libretti for Faccio's *Amleto*, Ponchielli's *Gioconda*, and for Verdi's *Otello* and *Falstaff*, and translated several of Wagner's works into Italian. Under the anagrammatic pen name of Tobio Gorria he published several novels.

BOIVIN, bwa'vin', MARIE ANNE VICTOIRE GILLAIN (1773-1841) A French midwife. She was educated in a convent and studied anatomy and midwifery at Etampes with a relative, the superior of the Hospitalières, and afterward at the Hôtel Dieu of the same place. She received the degree of M D from the University of Marburg. After the death of her husband she took the place of midwife in the Maternity Hospital and in 1801 became chief overseer. She caused the establishment by Chaptal of a special school of accouchement. Her *Mémorial de l'art des accouchements* (1812) is a well-known work. She is also author of *Mémorial sur les hémorrhagies internes de l'utérus* (1818), *Recherches sur une des causes les plus fréquentes et les moins connues de l'avortement* (1828), *Traité pratique des maladies de l'utérus et de ses annexes* (2 vols, 1832-33).

BOJADOR (Portug pron bō'zha-dō'r'), CAPE (Portug one that juts or bulges) A headland on the west coast of Africa, in lat 26° 7' N, long 14° 30' W, at the northern coast boundary of the Spanish possessions (Map Africa, C 2). In consequence of its extreme flatness, and the shoreward tendency of the currents, the coast, extending northward to Cape Nun, abreast of the Canary Islands, is very dangerous for navigation. The Portuguese doubled this cape in 1483, and from them it received its name "Bojador Cape," signifying 'a round cape'.

BOJANO, bō-ya'nō (anciently, Samnite *Boevanum*, Gk. *Bolavor*, *Boananon*) A city in the

province of Campobasso, in the province of Abruzzi e Molise, south Italy, on the Biferno, 18 miles southwest of Campobasso (Map: Italy, J 6). It lies in a deep valley on the northeast slope of the Matese Mountains, which for four months of the year shut off the light of the sun. It is the seat of a suffragan bishop and has a cathedral, five churches, and a seminary. There are ruins of a Roman theatre and a temple and of the walls of the ancient Bovianum, which during the Samnite wars was often besieged. During the Second Punic War it was several times the headquarters of the Roman army, and in the great Social War the Confederates, on the fall of Corfinium, made it their capital. It has suffered greatly from earthquakes, especially in 1805. Pop. of commune, 1901, 6337; 1911, 6439.

BOJAR, bô-yâr'. See BOJAR.

BOJER, bô'yér, JOHAN (1872-). A Norwegian author, born in Drontheim and reared there as an orphan by a laborer's family. While working for a merchant he got time to attend the Latin school. His first drama, *A Mother*, secured him a scholarship, which enabled him to continue his education. His works include the historical drama *Olaf den Hellige* (1897), and the stories *Helga* (1896), *Den evige Krug* (1899), *Moder Lea* (1900), *Troens Magt* (1903). He also wrote *Vortrige* (1908); *Kjærlighetens oie* (1910); and the novel, *Luv* (1911).

BOK, bok, EDWARD W. (1863-). An American journalist. Born in Helder, Holland, he came to the United States in 1869, had a public-school education, and was for a time in the employ of Henry Holt and Company and Charles Scribner's Sons, publishers. In 1886 he formed the Bok Syndicate Press, which handled Beecher's sermons and did a large business. He edited *The Beecher Memorial*, 1887. In 1889 he became editor of *The Ladies' Home Journal* of Philadelphia, which, under his editorial supervision and the ownership of Cyrus H. K. Curtis (q.v.) reached an enormous circulation and gained a position of great influence. Bok published *Successward* (1895) and *Keys to Success* (1900).

BOKELMANN, bô'kel-mân, CHRISTIAN LUDWIG (1844-94). A German genre and portrait painter. He was born at St. Jürgen near Bremen, and studied under Wilhelm Sohn at the Düsseldorf Academy. His earlier pictures depend for their effect chiefly upon the literary anecdote; but in his later works he rises to an impressive and characteristic delineation of the life of the people, with good plain-air effects. The best of his works are "House of Sorrow" (1873); "Pawnbroker's Shop" (1876, Museum, Stuttgart); "Opening of the Will" (1879); "A Village Fire"; "Strike of Laborers"; "North Frisian Peasant House" (1888), and "Alone" (1892), perhaps his masterpiece, the last two in the National Gallery, Berlin. His portraits are conceived in a pictorial sense and are well characterized.

BO'KER, GEORGE HENRY (1823-90). An American poet, dramatist, and diplomatist, born in Philadelphia. He was the son of a banker, graduated at Princeton in 1842, studied law, but did not practice, and after a tour in Europe published a volume of poems, *The Lesson of Life* (1847). His tragedy *Calagnos* (1848) was staged with success, and he produced many others: *Anne Boleyn*, *Leonor de Guzman*, *Francesca da Rimini*, *The Betrothed*, and *The Widow's Marriage*. Of these, *Francesca da Rimini*

is considered the best. It has been revived several times by Barrett and other actors. Boker collected his *Plays and Poems* in two volumes in 1856. The Civil War inspired him to much patriotic poetry, which made up his *Poems of the War* (1864). Later volumes of verse were *Street Lyrics* (1869), *Königsmark and Other Poems* (1869), *The Book of the Dead* (1882), and *Sonnets* (1886). The interval between these last volumes he spent largely in diplomatic service. He was appointed Minister to Turkey in 1871 and was transferred to Russia in 1875, where he remained till 1879. Boker's poems and dramas are much above the average in style and power, but have never achieved real popularity. His last book was a volume of *Sonnets* published in 1886.

BOKHARA, bô-khârâ, or BUKHARA. A Russian protectorate in Central Asia, bounded by Russian Turkestan on the north, the Pamir region on the east, Afghanistan on the south, and the Russian Transcasian Territory and Khiva on the west (Map: Asia, Central, J 2). It lies approximately between lat. 37° and 42° N. and long. 62° and 72° E. The extent of its area cannot be ascertained with accuracy, owing to the unsettled state of some of the boundary lines. General estimates vary from 80,000 to 93,000 square miles.

A considerable extent of the country consists of desert land and steppes interspersed with fruitful oases. The eastern part is very mountainous. The most fertile and cultivated regions are found along the rivers. The chief river is the Amu Darya, which forms the southern boundary and flows close to the western boundary and with its tributaries drains a large part of the country. The Zarafshan flows through the northwestern part, losing itself in the sands a short distance from the Amu Darya. The climate is warm and generally healthful. The summers are hot, and the winters very cold, with considerable snowfall. The rainfall is very scant, and occurs mostly in the spring.

The dry climate of Bokhara makes it necessary to utilize almost all the smaller rivers for irrigation. The oases and valleys are exceedingly fertile, and agriculture is a flourishing industry. The chief agricultural products are wheat, rice, barley, tobacco, lucerne, flax, cotton, and dye plants. There are also produced large quantities of fruit, including several varieties of grapes, peaches, apricots, and nuts. Sericulture is carried on. Sheep raising is also an important industry, the skins of the native lambs being exported to Russia for making coats. Horses, cattle, goats, and camels are also raised. The manufacturing industries of Bokhara are chiefly confined to the production of textiles and are carried on on a very small scale and by the most primitive methods. The chief products are cotton and woolen fabrics, silk, coarse cloth, and a kind of felt called *koshma*, leather goods, including footwear and saddles, and small metal products, such as knives, locks, etc. The mineral industry is as yet undeveloped. Salt and gold are mined, the latter by the Russians in Safet-Darya; iron and copper are found.

The foreign commerce of Bokhara is quite important, owing to its central location, and Bokhara, the capital, although it has lost a considerable portion of its commercial importance and splendor, is still considered an im-

portant seat of commerce in Central Asia. The trade is chiefly with Russia, India, and Persia, and is carried on mostly by means of caravan routes and the Transcaspian Railway, as the wagon roads are very few and in poor condition. The main imports are manufactured goods, sugar, tea, indigo, drugs, etc. Exports are lambskins, cotton, silk, and agricultural products. The Transcaspian Railway, which runs through Bokhara for about 186 miles, has had a very good effect on the commerce of the country, which has considerably advanced under the protection of Russia. The capital is connected by telegraph with Tashkent.

Bokhara is an absolute monarchy, the ameer being invested with unlimited powers. The immediate administration is in the hands of several high officials, each at the head of a separate department. For purposes of administration Bokhara is divided into districts, administered by beks, who are obliged to turn a certain sum of money every year into the treasury of the ameer, in addition to suitable gifts, consisting mostly of cattle, etc. The beks are not paid by the government, but are expected to get their share out of the taxes collected by them. The army consists of a regular force and a militia, and is recruited chiefly from volunteers, but in case of a holy war every Mussulman capable of bearing arms is liable to military service. The standing army numbers 11,000 men, only a small portion being armed and drilled according to Russian methods. It is practically fit only for police duty. There are about 20 guns, mostly made of copper, served by 600 artillerymen.

The population is estimated at about 1,500,000 (10,508 Russians). It consists mainly of Uzbeks, Kirghiz, who are largely nomadic, Tadzhiks, Turkomans, Arabs, Afghans, Sarts, Persians, and some Jews and Russians. The prevailing religion is Mohammedanism. With the exception of Bokhara (qv), the capital, and Karshi (pop. about 25,000), there are few towns of any importance.

History. Bokhara was in ancient times called Sogdiana, and sometimes Transoxiana, and was inhabited in antiquity by Iranian tribes professing Zoroastrianism. At a very early period the country was invaded by Iranian newcomers, who were Buddhists, and a long struggle ensued between the two, in which the difference in religion played no less important part than that of race. It was conquered 640-642 by the Arabs, who brought with them the faith of Islam, and Bokhara was a field of incessant contests and fighting, until, with the rise of the Samanid dynasty, in the latter part of the ninth century, it became a mighty monarchy, the bulwark of Islam, and a great centre of learning. The dominions of Bokhara at that time reached down into Afghanistan and Khurasan. At the end of the eleventh century the country, together with much of the Mohammedan world, was conquered by the Seljukian Turks. Under the rulers of that period (1004-1133) Iranian and Arabic continued as the languages of culture, Turkish being employed by the court for conversation only. After that Bokhara was a bone of contention between competing rulers, until conquered by Genghis Khan in 1220, when the capital was burned to the ground, the kingdom devastated, and most of the inhabitants slain. For a century and a half these invaders ruled over Bokhara. Having

embraced Mohammedanism, they favored their kindred, the Turks, so that the latter soon gained the ascendancy. Under Timur, or Tamerlane (died 1405), Bokhara became of great political and commercial importance, its capital, Samarkand, being full of gorgeous palaces, splendid mosques, and very extensive gardens. After his reign, however, it became the arena of bloodshed and was for nearly 100 years, until conquered by the Turko-Mongolian Uzbeks, about the year 1500, which marks the beginning of Bokhara's decline. With the single exception of the scholarly Abdullah-Khan (in the sixteenth century), her monarchs have been typical Oriental rulers, cruel and steeped in fanaticism. Nasrulla-Khan (1827-60) was perhaps the most infamous in a long series of infamous potentates. It was he who caused, in 1842, the death of Colonel Stoddart and Captain Conolly, who went on a mission to Bokhara. Dr. Wolff, who visited the country in 1844, with a view to ascertain their fate, narrowly escaped with his life, after a detention of some months. By the middle of the nineteenth century the steady, aggressive expansion of Russia in Central Asia cast a shadow on the Khanate of Bokhara, and a clash of arms became imminent, unless the Khan were to submit to the rule of the Czar without resistance. In 1865 the Russians occupied Tashkent, and Khan Mozaffaredin, son of Nasrulla, accepted this as a challenge to open hostilities. He took the field in person, but his army was badly defeated at Ijaj, on May 20, 1866. The Russians pushed farther and after many successful battles entered Samarkand, in May, 1868. The fortress of Katti-Kurghan was then stormed and taken, and on June 14 the Ameer was completely defeated on the Zerabulak Heights. By the terms of the peace concluded in July, 1868, Samarkand, and the Katti-Kurghan, Penjekent, and Urgut districts—the best portions of the Zerashan valley—were ceded to Russia. Besides paying 500,000 rubles (about \$250,000) indemnity the Ameer granted special privileges to Russian trade. This final blow brought Bokhara into Russian vassalage. In return for complete obedience, the Russians gave the Ameer active assistance in suppressing revolt within his possessions. Thus, in 1868, the Russians dispersed the hordes of rebels who wanted to enthrone the Ameer's eldest son, Abdul-Malik-Mirza. After the Russian expedition against Khiva (1873) Bokhara was given a large strip of Khivan territory for supplying the Russian army of invasion with camels and provisions. In 1877 the territory of Bokhara was expanded eastward by the conquest of Darwaz and Karategin. During the intervening years the Russian government pushed forward its imperialistic policy, putting down rebellions here and there and at times with great loss. In 1885 the present Ameer, Sayyid-Abdul-Ahad, came to the throne. In 1886 he abolished slavery. He visited St. Petersburg in 1893 and left there the heir to the throne to be given a Russian education. The Ameer, though tractable to the Russian government, continues to symbolize to a certain measure that national particularism which is so characteristic of the people of the Khanate.

Consult Vámbéry, *History of Bokhara from the Earliest Period to the Present Time* (London, 1873), Cuzon, *Russia in Central Asia* (1889) and *The Pamirs and the Source of the*

Oxus (London, 1897); Le Messurier, *From London to Bokhara* (London, 1899); O'Donovan, *The Merv Oasis* (2 vols., London, 1880); Reclus, "Asiatic Russia and the Middle Asiatic Khanates," in *Universal Geography* (Paris, 1876-94); Capus, *A travers le royaume de Tamerlan* (Paris, 1892); Rickmers, "Travels in Bokhara," *Geographical Journal*, vol. xiv (London, 1899); Skrine and Ross, *The Heart of Asia* (London, 1899); Olafsen, *The Emir of Bokhara and his Country* (London, 1911).

BOKHARA (Mongol. *bulhar*, church). The capital of the khanate of the same name, and one of the most important commercial centres of Central Asia, situated in a valley near the river Zerashan, and only a few miles from the Transcasian Railway (Map: Asia, Central, J 2). It is irregularly built and surrounded by a high wall. The streets are narrow and crooked and mostly unpaved. The houses, built, as a rule, of unburned brick, are low and without windows on the streets. Bazaars, both covered and open, are numerous and well stocked with Oriental wares as well as with European manufactures. Bokhara has as many mosques as streets, a few of them noteworthy. The chief is the Mirgharab, surmounted by a cupola 100 feet high, covered with blue tiles. Adjoining it is the high minaret which was used until 1871 for the execution of state criminals by hurling them from its top. The citadel is situated on an artificial elevation and contains the palace of the ameer, the houses of the higher officials, the jail, and the water cisterns. The city is intersected in several directions by a canal, which is spanned by numerous bridges. Bokhara is a centre of culture and Islamicist erudition, and contains about 60 high madrasahs as well as a large number of minor ones. There are a considerable number of manufacturing establishments, producing silk fibres, coarse cloth, blades, and metal articles. The commerce is carried on to a large extent in articles of Russian manufacture, textiles, leather goods, etc. A few miles distant from the capital, on the railway line, is situated a small Russian settlement named New Bokhara, or Kagan, containing about 2000 inhabitants. The population of the capital is estimated at about 70,000.

BOKHARA CLOVER. See MELLILOT.

BOKHARI. See BUKHARI.

BOL, bōl, FERDINAND (1616-80). A Dutch portrait and religious painter. He was born in Dordrecht and studied with Rembrandt soon after the latter came to Amsterdam (1631). He was one of the master's cleverest pupils, and his earliest works, both paintings and etchings, are sufficiently good to have been confused with Rembrandt's. His later style is more elegant and less virile. For a time he was the most popular portrait painter in Amsterdam; he made two wealthy marriages and occupied an honored position. Of his portrait groups the best are the "Regents of the Leper Hospital" (1649), in the Town Hall, and the "Regents of the Poor House" (1657), in the Rijks Museum, Amsterdam. The best known of his portraits are those of Admiral de Ruyter (1699, Rijks Museum, Amsterdam, and Copenhagen), and of his son Engel de Ruyter (The Hague). Among his best religious subjects are "Repose on the Flight to Egypt" (1644, Dresden), "Joseph Interpreting his Dream" (Schwerin), and "The Women at the Sepulchre" (Copenhagen). Bol is well represented in practically all German and

Dutch museums, especially in those of Amsterdam, Berlin, Cassel, Frankfurt, and Munich, as well as in Paris, London, Stockholm, Copenhagen, and St. Petersburg.

BOLA BO'LA, or **BO'RA BO'RA**. One of the Society Islands (q.v.), about 200 miles to the northwest of Tahiti, in lat. 16° 30' S. and long. 152° E. (Map: World, L 6). It rises to a height of nearly 2400 feet, is fertile, and has a population of about 1800 inhabitants.

BOLAK. See UNIVERSAL LANGUAGE.

BOLANDEN, KONRAD VON. See BISCHOFF, JOSEPH EDUARD KONRAD.

BOLAN (bō-lan) **PASS.** A defile in the mountains of British Baluchistan on the great highway leading up from the Indus via Shikarpur, Dadar, and Quetta to Kandahar (Map: Asia, F 5). It extends northward from the neighborhood of Dadar, for a distance of about 55 miles, until it reaches a plateau nearly 5800 feet above the sea. The average ascent is about 90 feet to the mile. It is bounded throughout by eminences 500 feet in height. A military railroad has been constructed by the British through the Bolan Pass to connect Sindh with Kandahar. It is now completed as far as the border of Afghanistan.

BOLAS, bō'lās (Sp. *bola*, ball, from Lat. *bullo*, bubble, round object). A hunting weapon used by various tribes of Mexico and South America, particularly those of the Pampas. It consists of three leather-covered balls of clay or stone, radiating from a central knot and attached to the end of a stout rawhide rope. It is thrown from horseback in such a way as to entangle the legs of the animal and hold it until the hunter comes up.

BOLBEC, bōl'bēk'. A town of France in the department of Seine-Inférieure, about 18 miles from Havre (Map: France, N., F 3). The Bolbec, on which it stands, supplies water power for its mills, where cotton, woolen, and linen goods are manufactured. It has also considerable trade in grain, horned cattle, and horses. Pop., 1901, 11,663; 1911, 11,080. Consult "Cités Ouvrières de Bolbec," in *Nouvelles Annales de la Constitution* (Paris, 1878).

BOLDINI, bōl-dē'nē, GIOVANNI (1845-). An Italian genre and portrait painter, belonging to the Parisian school. He was born in Ferrara, the son of a painter of religious subjects, and studied at the Academy of Florence. He attained great success as a portrait painter in London, but in 1872 he removed to Paris, where he has been identified with the progressive element in French painting. He is a member of the Société Nationale des Beaux-Arts, has received numerous medals, and is Chevalier of the Legion of Honor. His art is essentially Parisian—chic, piquant, and sparkling with esprit, and he is master of a brilliant and highly modern technique. Among his principal paintings are "The Connoisseur," "Gossip," "Delivering the Despatch," "Kitchen Garden," "Repose in the Atelier," and the delightful "Spanish Dancer," often reproduced in prints. He is represented in the Luxembourg by the "Portrait of a Lady" and "Au Luxembourg," and in the National Gallery, Berlin, by a portrait of Menzel. The Vanderbilt collection (Metropolitan Museum, New York City) possesses two fine examples, "Ladies of the First Empire" and "Des Parisiennes"; the Brooklyn Institute Museum the remarkable portrait of his friend Whistler.

BOLDREWOOD, bôl'dër-wud, ROLF (Thomas Alexander Browne) See AUSTRALIAN LITERATURE

BOLE (Gk βῶλος, *bôlos*, lump of earth, clod, nugget) A hydrous aluminum silicate that is found massive, and constitutes a variety of halloysite. It is a clay-like body, containing more or less iron oxide, which gives it a yellowish to red-brown or dark color. It has a conchoidal fracture, and when thrown into water falls to pieces. It is unctuous to the touch, and some varieties adhere to the tongue. It is found in Armenia, Italy, France, Germany, Iceland, Scotland, and South America. Bole is used as food by the natives of certain parts of South America, and by the Japanese it is favorably regarded as a means for producing leanness. *Armenian bole* is of a bright-red color, due to the oxide of iron that it contains, and has been used as a dentifrice. It has also been prescribed as a tonic and as an astringent medicine, finding in recent years its most important use in veterinary practice. *Lemnian bole* is of similar character and is obtained from the island of Lemnos. When calcined, washed, and ground, it is applied as a pigment and is known variously as *Blois bole*, which is yellow in color, *Bohemian bole*, which is yellowish red, *French bole*, which is pale red, and *Silesian bole*, which is pale yellow.

BOLERO, bô-lä'rô (Sp) A Spanish national dance, mostly in the time of a minuet, with a sharp, marked, and peculiar rhythm. It is accompanied with the castanets and the cithern and frequently also with the voice. The dancer in the movements seeks to represent the different degrees of feeling from coyness to the highest ecstasies of love. The term has, by extension, come to be applied also to the air to which it is danced, and some composers (notably Moszkowsky) have named their dance music "boleros."

BOLETUS (Lat *boletus*, from Gk βῶλην, *bôlêta*, a kind of fungus) A genus of Basidiomycetous fungi of the family Boletaceæ. The older botanists included it in the numerous species now forming the genus *Polyporus* (see AMADOU, DRY ROT) and other genera, but even as now restricted, it is a very extensive genus. Many of the species resemble the common mushroom and other species of *Agaricus* in form, but instead of gills, the under side of the cap (*pileus*) is occupied by a layer quite distinct from it in substance, and pierced by pores so as to be composed of a multitude of small tubes on the inside of which the spore cases or seed vessels are produced. Some of the species are edible. *Boletus edulis* is much used in France, also in Germany, Hungary, Russia, etc. It is the *ceps ordinaire* of the French markets. It grows on the ground in woods, in places covered with moss, heath, or grass. In moist, warm summers it sometimes appears in immense quantities, attaining a size of 6 inches or more across. The tubes are removed with the skin and stem, and only the flesh of the cap is eaten, which is firm, white, delicate, of agreeable smell, and is prepared like the common mushroom. For illustrations, see Colored Plate under FUNGI, EMBLE.

BOLEYN, bôl'en, ANNE (1507-36) Queen of England as second wife of Henry VIII. She was the mother of Queen Elizabeth. The date of her birth is given as 1501 or 1507, the latter being the more probable. The family name is frequently found in contemporary writings as Bullen, Bouleyn, Boullan, or Boulain. She was

the daughter of Sir Thomas Boleyn, afterwards Earl of Wiltshire and Ormond. In her twelfth year Anne went to France, where her elder sister, Mary, had previously accompanied. Mary Tudor, the affianced bride of Louis XII of France, and sister of Henry VIII. She remained at the French court three years, and soon after her return to England was wooed by Lord Henry Percy, the heir to the earldom of Northumberland, and by King Henry himself, who, in April, 1522, began to shower wealth and honors on her father, and before this had dishonored her sister Mary Henry's "religious scruples" regarding the lawfulness of his marriage with Catharine became too urgent for the slow decision of the court of Rome, but not till the King's divorce was set afoot (in May, 1527) did Anne favor his addresses. However, long before Cranmer pronounced the divorce (May 23, 1533), she was Henry's mistress, and in the preceding January they had been secretly married. She was crowned with great splendor in Westminster Hall on Whitsunday, but within a few months Henry bade her "shut her eyes to his unfaithfulness, as her betters had done, for he could abase yet more than he had raised her." His cooling passion was not revived by the birth (September, 1533) of the Princess—afterwards Queen—Elizabeth. The new Queen, naturally light and gay of heart, and educated at the French court, where these qualities were likely to be developed to the utmost, conducted herself toward the courtiers with an easy familiarity not customary in England for one in her position. Concerning the first two years of her married life we have little information. It is said that she was favorable to the Reformation, and promoted a translation of the Bible. In January, 1536, the Queen gave premature birth to a son. The mishap is said to have been caused by learning of the King's newly developed passion for Jane Seymour, her successor. The King became more and more estranged, and her freedom of manners had given but too good grounds for her enemies to speak evil of her. On May 1 the annual tournament was held at Greenwich, in the presence of the King and Queen. The tilting had commenced, the challengers being Viscount Rochford, brother to the Queen, and Sir Henry Norris, one of the gentlemen of the King's Privy Chamber. Suddenly the King rose, his outward bearing manifesting inward disturbance, left the tourney, and with a small party rode up to London, leaving the Queen at Greenwich. The popular account is that the King had seen her drop a handkerchief into the lists in order that one of her presumed lovers might wipe his face, but the necessity for any such romantic and sudden pretense of jealousy is annulled by the fact that in the previous week a commission composed of members of the Privy Council had been secretly engaged in examining charges of adultery against Anne, indeed, two of her alleged accomplices, Sir William Brereton, a gentleman of the King's household, and Mark Smeton, a musician at court, had already been arrested. The Queen remained at Greenwich that night. On the following morning she was examined before the Privy Council, and protested her innocence. In the afternoon she was sent up the river to the Tower. Sir Henry Norris and Sir Francis Weston, another courtier, along with Smeton, were also examined, and all at first declared their innocence of the charge imputed to them, but under torture, the musician con-

fessed to the crime. In the Tower, the Queen's every action and word were watched and reported; but anything she said while a prisoner seems quite as compatible with innocence as with guilt. Her letter to Henry, written on May 6, speaks decidedly in her favor, but this letter is now supposed to be a fabrication of the time of Elizabeth. On the 10th of May the Grand Jury of Middlesex found a "true bill" on the indictment which charged the Queen with committing adultery with no less than five persons, including her own brother, Lord Rochford, and of conspiring with them, jointly and severally, against the life of the King, the adultery being alleged to extend over a period of nearly three years. On the 11th the Grand Jury of Kent also found a true bill. On the 12th the four commoners, Brereton, Weston, Norris, and Smeton, were found guilty, the last confessing to the charge of adultery only, the other three pleading not guilty to both charges. With her case thus prejudged, on the 15th the Queen and her brother were tried before 27 peers. Their uncle, the Duke of Norfolk, was president, and their own father was one of the judges. The accused affirmed their innocence, but were found guilty and condemned, the Queen to be burned or beheaded on the Tower Green. On the 17th Smeton was hanged, and the other four beheaded; general protestations of unworthiness by them at the hour of death being regarded by some historians as evidence of guilt. On the 19th, the Queen was beheaded, with her last words, praying a blessing on Henry, who, she said, had ever been to her a good and gentle lord, but making no confession of guilt. Henry was betrothed to Jane Seymour the next day.

It is difficult to form anything like a just and satisfactory estimate of the character of Anne Boleyn—historians, for the most part, having made her but a lay figure upon which to hang the drapery of religious partisanship, or to display the colors of individual sympathy. That she was guilty of adultery with Henry is certain; but that she was guilty of the other heinous offenses laid to her charge remains at least not proved, and it is a suspicious fact that every trace of evidence has vanished. The character of this "mother of the English Reformation" was not saintly; but she was not the Jezebel that Saunders, the Jesuit, would have us believe. According to him, she was even in person ugly, misshapen, monstrous; but although Holbein's portraits do not confirm the statements of others that she was "comely," we know that she had beautiful eyes and hair, and that her only positive defect was a supplemental nail. Consult: "Letters and Papers of Henry VIII.," "Love Letters of Henry VIII to Anne Boleyn" in *Harleian Miscellany*, vol. iii (London, 1744). The best biography, Catholic in general tone, is Friedmann, *Anne Boleyn* (London, 1885). For Henry's side consult Froude, *History of England* (New York, 1871). The best account of the period is Pollard, *Henry VIII* (London, 1905).

BOLGARY, bôl-gá'ri (Russ. the Bulgarians). Also called **USPENSKOYE**. A village in the government of Kazan, Russia, about 16 miles from Kazan, and 4 miles from the Volga. It is well known for the historical remains it contains in the form of buildings, walls, minarets, etc. It occupies the site of Bolgar, called by the Russian chroniclers Veliki Gorod (the 'Great Town'), capital of the old Bulgarian Kingdom. The time of its foundation is unknown. But in

the writings of Ibn-Khankal, in the latter half of the tenth century, it is stated that after the town had been ravaged by two victorious Russian armies it still had a population of about 10,000. At a much later period, when Bolgary was conquered by the Mongols, the old capital declined considerably. Sacked and almost destroyed by Timur ('Tamerlane') in the fourteenth century, it was completely ruined at the time of the fall of the "Golden Horde."

BOLGRAD, bôl-grád' (for *Byelgrad*; see *BELOGRADE* for derivation). A town in the government of Bessarabia, Russia, on Lake Yalpukh, situated about 75 miles southwest of Akerman (Map: Russia, C 5). It trades in grain and produces brick and tallow. Pop., 1897, 12,388, mostly Bulgarians.

BOLI, bô'le, or **BOLY** (corrupted in popular speech from Gk. πόλις, *polis*, the city, from Hadrianopolis; cf. Turk, *Stambul*, Constantinople, for *eis tîn pólin*, *eis tîn polin*, to the city). A town of Asiatic Turkey, in the vilayet of Kastamuni, on the left bank of the river Boli, and 136 miles east of Constantinople (Map: Turkey in Asia, D 2). The town occupies an eminence at the extremity of a fertile plain. It has several mosques, and in the vicinity are the historic ruins of the birthplace of Antinous. There are manufactories of leather, cotton, and wool, and a lively trade in timber is carried on. Boli is on the caravan route from Constantinople to Erzerum. Pop., estimated at 11,000.

BOLIDE. See *METEORS*.

BOLIN, bô'len, **ANDREAS WILHELM** (1835-). A Finnish scholar, philosopher, and author. He was born in St. Petersburg, studied in Helsingfors, and was appointed professor of philosophy in 1865, and in 1872 university librarian. In philosophy he is a disciple of Ludwig Feuerbach. His principal works are: *The Family* (1864); *European Public Life and the Political Doctrines of Philosophy* (2 vols., 1868-71); *Doctrine of the Freedom of the Will* (1868); *Ludwig Feuerbach, His Influence and Contemporaries* (1891); *The Beginnings and Development of Religion* (1909); and an edition of Shakespeare's works in Hagerberg's translation with the Gilbert illustrations (2d ed., 1899).

BOLINGBROKE, bôl'ing-bruk, formerly bul'ing-bruk, **VISCOUNT HENRY ST. JOHN** (1678-1751). An English statesman, orator, and author. He was born at Battersea, Oct. 1, 1678. He was educated at Eton, and, it is said, at Oxford; but the only ground for this assertion is that of the honorary degree conferred upon him by the university in 1702. During 1698-99 he resided on the Continent, and acquired a knowledge of the French language, which was afterwards of service to him. His early manhood was notorious for extreme licentiousness, but having entered Parliament in 1701, he devoted himself to politics and, joining the Tory party, soon made himself prominent as an orator. In 1704 he was made Secretary of State for War. This office he retained till 1708, when the Whigs came into power, after which he retired from politics, and gave himself up to study, but still retained great influence as the Queen's favorite counselor. On the fall of the Whig party in 1710, he was made Secretary of State for Foreign Affairs. In 1712 he was called to the House of Lords with the title of Viscount Bolingbroke, and in 1713, against the wish of nearly the entire nation, concluded the Peace of Utrecht. Having previously quarreled with his old friend

Harley—now Earl of Oxford, and his most powerful rival—he contrived his dismissal in July, 1714, and immediately proceeded to form a strong Jacobite ministry, in accordance with the well-known predilections of his royal mistress. Her death, however, three days later, disconcerted his schemes, and the accession of George I proved a deathblow to his prospects. On the 28th of August he was deposed from office, in March, 1715, he fled to France, and in August of the same year was attainted. For some time he held the office of Secretary of State to the Pretender, but his restless and ambitious spirit yearned for the 'large excitement' of English politics. His efforts to obtain a pardon not proving in the meantime successful, he retired to a small estate which he had purchased near Orleans. In 1718 his first wife died, and in 1720 he married the rich widow of the Marquis de Vilette. A judicious use of this lady's wealth enabled him to return to England in May, 1725. His property was restored to him, but he was never permitted to take his seat in Parliament. He therefore betook himself to his villa at Dawley, near Uxbridge, where he occasionally enjoyed the society of Swift, Pope, and others of his old friends, with whom he had corresponded in his exile, and where he diversified his moral and metaphysical studies by his attacks on the ministry in his periodical, *The Craftsman*, in which the letters forming his *Dissertation on Parties* first appeared. In 1735, finding his political hopes clouded forever, he went back to France in chagrin, and continued there till 1742. During his second residence abroad he wrote his *Letters on the Study of History*, in which, as a Deist, he violently attacked the Christian religion. He is believed to have influenced the thought of Voltaire. It was also during this period that he wrote his famous *Patriot King*, an attempt to create in England the idea of "benevolent despotism" then so prevalent on the Continent. He died, after a long illness, in 1751. Bolingbroke has been styled the Alcibiades of his time, and was admired by his contemporaries for his graceful person and charming manners. His talents were brilliant and versatile, his style of writing was polished and eloquent, and repays study to the present day, but the lack of sincerity and honest purpose which characterized him, and the unscrupulous ambition which made him aim for power, hindered him from looking wisely and deeply into any question. His philosophical theories are not profound, nor are his conclusions solid, while his criticism of passing history is worthless. His collected writings were published by Mallet (London, 1753-54).

Bibliography. Goldsmith, *Life of Lord Bolingbroke* (London, 1770), Collins, *Bolingbroke A Historical Study* (London, 1886), Sichel, *Bolingbroke and his Times* (2 vols., London, 1901, 1902), Stephen, *Religious Thought in the Eighteenth Century* (New York, 1876), Lecky, *England in the Eighteenth Century* (7 vols., London, 1892).

BOLINTINEANU, bô-lân-tâ-nê-an', DIMITRI (1826-72) A Rumanian poet and journalist, born at Bolintina, Wallachia. He was a member of the civil service, but lost his post through the publication of political articles and poems. Subsequently, at the time of the revolutionary outbreak against the Russian protectorate, in which he took a prominent part in his journal, *Poporul Suceran*, which he founded (1848), he was proscribed and fled the country (1849).

After his return he was appointed Minister of Public Instruction (1859). He was the representative poet of the Rumanian Renaissance. In addition to his *Rumanian Melodies* (1858) and other verse, he wrote diamas, satires, and works of fiction. Selections from his poetry were translated into French under the title *Bruses d'orient* (1866), and other selections into German by Carmen Sylva under the heading *Rumanischen Dichtungen* (3d ed., 1889). His poems were collected and published in 2 vols. (Bucharest, 1877).

BOLÍVAR, bô-lí-vêr A city and the county seat of Polk Co., Mo., situated 1071 feet above sea level, 39 miles north-northwest of Springfield, on the St. Louis and San Francisco Railroad (Map Missouri, C 4). It has a considerable trade in apples, poultry, eggs, cattle, horses, and mules. The city is the seat of the Southwest Baptist College, opened in 1878. Settled about 1835, Bolivar was incorporated in 1855 and is now governed under a charter of 1881, which provides for a mayor elected biennially and a city council. The water works and electric light plant are owned and operated by the municipality. Pop., 1890, 1485, 1900, 1869, 1910, 1975.

BOLÍVAR, bô-lê-var A northern department of the Republic of Colombia, bounded by the Magdalena River on the east, the department of Antioquia on the south, Cauca on the west, and the Caribbean Sea on the west and north. It covers an area of 24,880 square miles (Map Colombia, B 2). It has a low surface, mostly still overgrown with thick forests and very little cultivated. Its chief rivers are the Magdalena with its tributary, the Cauca, and the Sinú, all navigable. The climate is hot and extremely unhealthy, especially for those accustomed to the temperate zone. Pop., about 227,000. Capital, Cartagena (q v).

BOLÍVAR The largest state of Venezuela, bounded by the Orinoco on the north, Colombia on the west, the territory of Alto Orinoco and Brazil on the south, and the territory of Yuruay on the east (Map Venezuela, E 2). Some cartographers include Yuruay as part of the state of Bolívar, which thus is made to extend to British Guiana. It covers an area estimated at 88,700 square miles and has a population (1904) of 55,217. Capital, Ciudad Bolívar (q v).

BOLÍVAR, Sp. pron bô-lê-var, SIMÓN, or BOLÍVAR Y PONTE, ã pôn'tá (1783-1830) A South American patriot, called the "Liberator." He was born in Caracas, July 2, 1783, of a noble and wealthy family. After studying law in Madrid, he traveled extensively on the Continent, married, and returned to his native country, where his wife died. He then revisited Europe and in 1809 returned by way of the United States, where he became an enthusiastic admirer of republican institutions and resolved to free his own country from foreign despotism. Arriving at Venezuela, he at once associated himself with a secret organization of the patriots there, and after the insurrection of Caracas, April 10, 1810, he was sent to London to gain the interest of the British Cabinet. The British government, however, declared its neutrality, and Bolívar speedily returned. He fought under General Miranda in several successful engagements. In 1812 the Spaniards recovered possession of Venezuela, and Bolívar fled to Curaçao. He did not, however, remain long inactive, but won the sym-

pathy of the republican President of New Granada, raised a force of volunteers, defeated the Spaniards several times, his army increasing with each victory; and on Aug. 4, 1813, entered Caracas as a conqueror. He was hailed as the liberator of Venezuela and made absolute dictator in civil and military affairs. After defeating the Spaniards in several engagements, he was himself beaten in the battles of La Puerta and Aragua. He now went to Cartagena and afterward to Kingston, in Jamaica. In Haiti he assembled the insurgent refugees, landed (December, 1816) on the island of Margarita, where he convoked a congress, instituted a government, and proclaimed the abolition of slavery. The following two years were marked by successes over the Spanish general, Morillo. In February, 1819, a congress was opened at Angostura, and Bolívar, chosen President, was armed with the power of dictator. He conducted his forces over the almost impassable Cordilleras to New Granada, and achieved the victories of Tunja and Sojaca. Soon afterward (in 1819) New Granada united with Venezuela as the Republic of Colombia, of which he became the first President. By 1822 the new republic was completely cleared of royalist troops. Bolívar was summoned the same year to help the Peruvians, and in February, 1824, was named Dictator of Peru. By 1825 the Spaniards were driven from Peru also; and Bolívar, calling a congress at Lima, formally resigned the dictatorship. The southern part of the country, which had detached itself from the government of Buenos Aires, was erected into a separate state and named Bolivia (q.v.), of which he was chosen perpetual protector. A form of government suggested by him was adopted by Bolivia in 1826. Widespread dissatisfaction in Colombia, where, in spite of considerable opposition, he was confirmed in the presidency in 1826 and 1828, led to a conspiracy against his life, which was suppressed by the execution of the leaders and banishment of 70 accomplices. In 1829 Venezuela separated itself from the Republic of Colombia, which was generally disturbed by factions. Bolívar's ambition was loudly denounced, and, virtually forced to resign, he retired to Cartagena. He died at San Pedro, Dec. 10, 1830, having shortly before his death written a farewell address to the people of Colombia, in which he vindicated his character from the aspersions that had been cast on it and complained bitterly of ingratitude. The war of liberation and the peculiar elements with which he had to deal compelled him to assume dictatorial power; but there is no proof that he was ever insincere in his devotion to liberty. He spent 90 per cent of his fine patrimony in the service of his country, and although for a long time he had absolute control of the resources of Colombia, Peru, and Bolivia, he never made any private use of public moneys. He has been described as the Washington of South America. By a resolution of the Congress of Colombia in 1842, his ashes were removed with great pomp from Santa Marta to Caracas, where a monument was erected to his memory. In 1846 Bogotá built a statue in his honor; and the Peruvians followed suit with an equestrian statue erected in Lima in 1858. A statue of Bolívar was erected in Central Park, New York, 1884. Twenty-two volumes of official documents connected with the career of Bolívar were published by the government at Caracas in 1826-33, and his correspondence, in two volumes, at New York

in 1865. Consult Ducondrey-Holstein, *Mémoires de S. Bolívar* (London, 1830); Carlos A. Villanueva, *Bolívar y el general San Martín* (Paris, 1911); Jules Manin, *Bolívar et l'émancipation des colonies espagnoles des origines à 1815* (Paris, 1912), and *Cartas de Bolívar* (1700-1822), with prologue by José Enrique Rodó and notes by R. Blanco-Pombona (Paris, 1913).

BOLÍVAR (bo-lé'vár) CITY. See CIUDAD BOLÍVAR.

BOLIVIA, *Sp. pron.* bó-lé'vya (in honor of Simón Bolívar). An inland South American republic, situated in the western part of the continent, and extending from about lat. 10° S. to 22° 50' S., and from long. 58° W. to 69° 30' W. It is bounded by Brazil on the north and east, by Paraguay and Argentina on the south, and by Chili and Peru on the west. Its area is about 556,000 square miles.

Topography. Topographically Bolivia may be divided into two provinces: (1) a western highland and (2) an eastern lowland. The former province is a part of the mountain system of the Andes. In 18° S. lat., in Bolivian territory, this system changes from a northwest-southeast to a north-south trend; here it attains its greatest width, about 450 miles. On each side the Bolivian highland is bordered by a high range. The eastern chain, or Cordillera Real, contains some of the highest peaks of the two American continents: Illampu, or the Nevado de Sorata, and the Illimani, both over 21,000 feet high; Todos Santos, 19,500 feet; Choroque, 18,500 feet; and the Cerro de Potosí, 15,500 feet. In the western range the peaks are generally much less lofty, but they include the giant volcano Sajama, 21,000 feet in height. Between the two ranges lies the region known as the Bolivian Plateau, or *Altiplano*, with an elevation of 12,000 to 13,000 feet. It contains Lake Titicaca (q.v.), which lies at an elevation of 12,500 feet—only the southeastern half is Bolivian—Lake Poopó and other lakes which are believed to be remnants of an inland sea. The mountain chains of Bolivia include many volcanoes, some of which are active at the present time. Cretaceous formations are found in the western range, while in the Cordillera Real Paleozoic rocks seem to predominate; but the geology of the region is only imperfectly known. The second province, the eastern lowland, extends northeast and east from the base of the Andes. The higher land which forms the divide between the Amazon and Paraná drainage basins and which extends in a general northeast direction from the angle of the Andes in 18° S., subdivides this region into two parts. The northern part is occupied by an extensive plain, which is traversed by numerous navigable rivers, and covered with dense tropical forests. The surface is generally level, and its decline from about 3000 feet near the Andes to about 300 feet at the eastern boundary is so gradual as to be almost imperceptible. The chief rivers of the country flow through this section, which belongs to the basin of the Madeira. The chief tributaries of the Madeira are the Madre de Dios, the Beni, the Mamoré and the Guaporé, which forms part of the boundary with Brazil. The southern part of the Bolivian lowland consists of the northern end of the Gran Chaco (q.v.), a level plain characterized by subtropical open forests. Its only drainage artery of importance in Bolivia is the Pilcomayo River. In the region of the Bolivian Plateau the only stream of importance is the

Desaguadero, which connects the lakes of Titicaca and Poopó, the latter also connected by a short river with the salt lake of Copasa.

Climate In regard to climate, Bolivia may be divided into three regions: the eastern lowland, or *tierras calientes*, where the climate is hot and damp, the highland region, or *tierras templadas*, with a more or less temperate climate, and the mountain regions, or *tierras frías*, where the climate is comparatively cold. At La Paz, situated at an altitude of 12,100 feet, the temperature ranges from 44° to 73°, with an average of about 50°. The coldest months are June, July, and August, when the temperature is marked by extreme fluctuations. During December, January, and February, which constitute the wet season, rains and hailstorms are frequent, and the rivers are subject to overflow. In the eastern lowland the wet season lasts from November to April, but rains occur also during other parts of the year, and inundations are frequent. This portion of the country is the most unhealthful, owing to the exhalations from partly submerged plains and the poor circulation of the air. The most salubrious and temperate climate prevails in the Yungas, the transitional region between mountain and plain on the eastern slope of the Andes, varying between 5000 and 9000 feet in elevation. For Europeans the climate is rather trying. Dysentery is the usual affliction of newcomers, and fevers and smallpox are not infrequent, even among the natives.

Flora The flora of Bolivia is most luxuriant in the region below 6500 feet, where the vegetation is essentially tropical, and where coffee, cacao, pineapples, bananas, cotton, sugar cane, rice, cinnamon, and vanilla, besides numerous medicinal plants, such as cinchona, sarsaparilla, etc., are cultivated. The forests, which are especially abundant in this region, are composed largely of ebony, mahogany, rosewood, cedar, cork, rubber, and numerous species of palm. The temperate zone includes all the territory lying between 6500 and 12,000 feet, and embraces the southeastern and a portion of the western departments. Here are found lemons, grapes, figs, peaches, and other European and southern fruits and vegetables, as well as the common cereals, wheat, corn, barley, etc. In the frigid zone, or puna, which comprises, in the territory lying above 12,000 feet, the mountains of the Andes and the high table-land around Lake Titicaca, the Bolivian Plateau, trees are entirely wanting and the cereals are cultivated only in the more favored regions. It affords, however, extensive grazing lands, and is inhabited chiefly by Indians engaged in pastoral pursuits.

Fauna The fauna of Bolivia is also characterized by great variety, but the difference between the zones is not so well marked as in the case of the flora. The jaguar, puma, tapir, armadillo, several varieties of monkeys, alligators, and many other South American species are well represented. In the higher regions are found the vicuña, guanaco, and llama. Birds also are numerous, and include a variety of parrots, pigeons, toucans, chatters, and humming birds, a few of which fly to altitudes above 14,000 feet.

Agriculture, Mineral Production, and Industry. Owing to climatic conditions agriculture has only a restricted development. Neither the raw climate of the highland nor the humid climate of the northern part of the lowland, with

its unbroken tropical forest, are conducive to agriculture. Those parts of the Gran Chaco where precipitation is sufficient may be potential agricultural areas, but as yet they are undeveloped, even almost unknown. Under present conditions agriculture is chiefly carried on in the Yungas region on the eastern slope of the Andes. Sugar cane, cinchona, cacao, bananas, pineapples, cotton, rice, pepper, and coffee are grown. The scant crops of the plateau include oca, a native tuber similar to the potato, corn, barley, and wheat. Of vegetable products rubber is of prime importance, the tropical forest of the lowland region furnishing an abundant supply. In 1911 rubber stood second in the list of Bolivian exports, with a value of \$7,800,000. The chief importance of Bolivia, however, lies in its vast mineral resources. The profusion of gold decoration found in the royal palaces and temples of the Incas at the Spanish conquest, as well as the numerous instruments belonging to the period preceding that event which are found in the mines worked at present, indicate that the gold deposits of Bolivia were exploited by the Incas. After the Spanish conquest the natives discontinued the mining of the metal, which was the chief cause of their downfall, and the work was subsequently taken up by the conquerors. The most important centre of gold mining was the Tipuani River, in the Andes not far from La Paz. After Bolivia became independent gold mining began to decline, and at present very few mines are worked by modern methods. Gold is supposed to exist in all the mountain streams of the northwestern as well as the southwestern parts of the country. At present silver, in the amount produced, ranks first among the minerals of Bolivia. This metal is worked chiefly in the department of Potosí, though it is believed that deposits exist in many other parts of the Bolivian Andes. The total production of silver, as reported by the chief mining companies, averages annually over 11,000,000 troy ounces. Tin is next in importance to silver. The tin mines are situated principally in the departments of Oruro, Potosí, La Paz, and Cochabamba, at an altitude of 14,000 feet, the most productive being in the departments of Oruro and Potosí. The output of tin has increased very rapidly, the methods employed being comparatively modern, and amounts at present to about 40,000 tons yearly. Rich copper deposits are located in the mountains near the Desaguadero River, in the department of La Paz. The average annual production of copper aggregates about 2000 tons. There are also deposits of bismuth, antimony, borax, salt, lead, zinc, etc. In Bolivia, as in other South American countries, inadequate transportation facilities and the lack of modern machinery—obstacles removable only by the aid of foreign capital—are factors which militate against the development possible to the valuable mineral resources. That the government is fully aware of this fact is evidenced by its liberality in the granting of concessions and in the matter of appropriations for the surveying of new railroad lines. Manufacturing industries are practically of no importance.

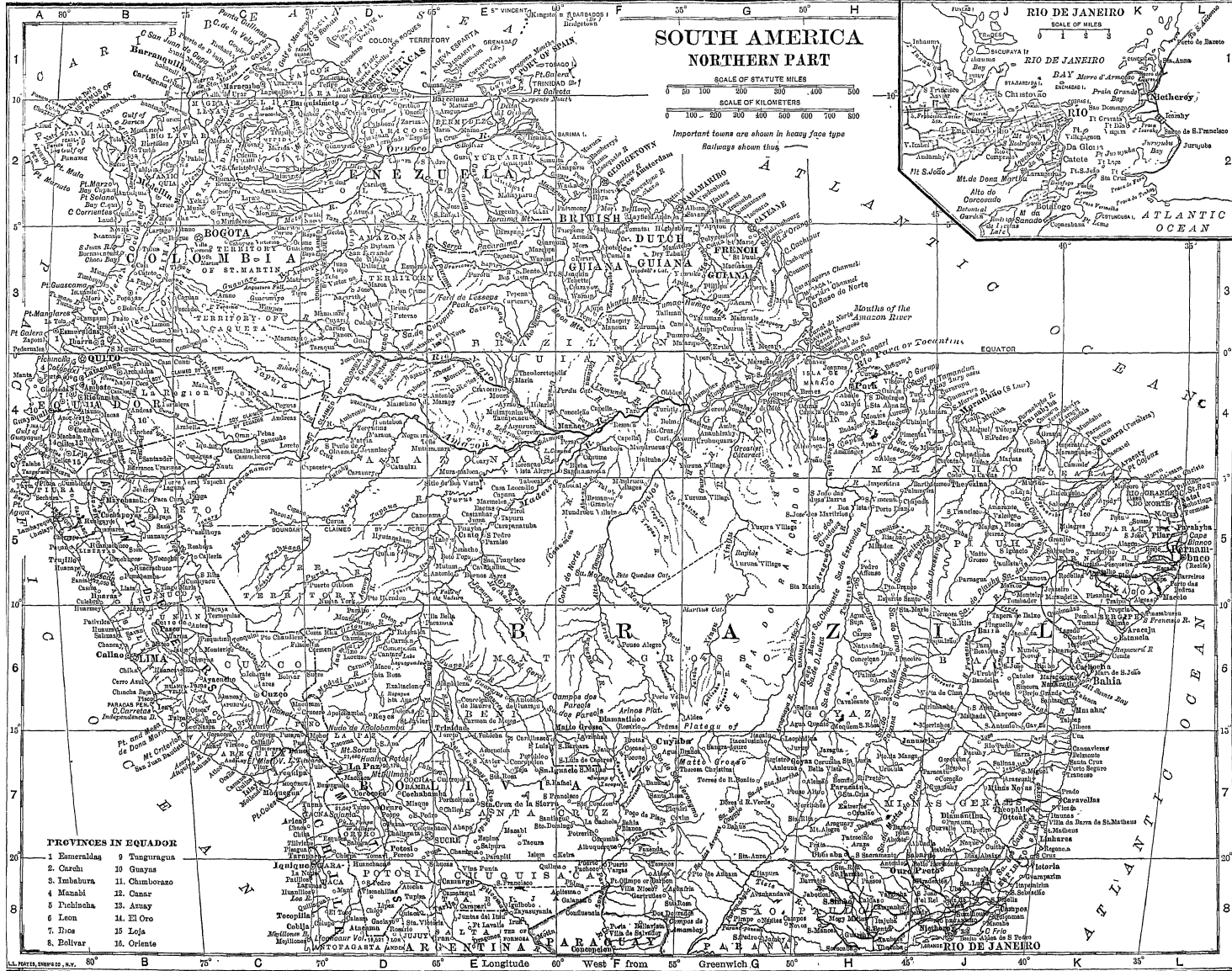
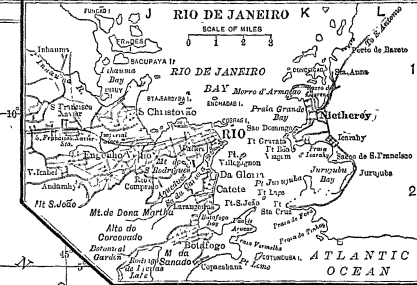
Commerce, Transportation, etc. Bolivia is greatly hampered in the development of commercial interests by its inland situation. It exports chiefly metals, rubber, wool, hides, and skins, and other raw products, the trade being carried on principally through the Chilean ports of Anto-

SOUTH AMERICA NORTHERN PART

SCALE OF STATUTE MILES
0 50 100 150 200 250

SCALE OF KILOMETERS
0 100 200 300 400 500 600 700 800

Important towns are shown in heavy type
Railways shown thus



PROVINCES IN ECUADOR

- | | |
|---------------|----------------|
| 1. Esmeraldas | 9. Tungurahua |
| 2. Cacha | 10. Guayas |
| 3. Imbabura | 11. Chimborazo |
| 4. Manabí | 12. Cuenca |
| 5. Pichincha | 13. Azuay |
| 6. Leon | 14. El Oro |
| 7. Dico | 15. Loja |
| 8. Bolivar | 16. Oriente |

Latitude 0° 5° 10° 15° 20° Longitude 75° 80° 85° 90° 95° 100° 105° 110° 115° 120° 125° 130° 135° 140° 145° 150°

fagasta and Arica, the Peruvian port of Mollendo and the river ports of Vila Bella and Puerto Suarez, on the eastern frontier. The imports for 1911 amounted to \$23,000,000 and the exports for the same year to \$32,000,000. Seventy-two per cent of the exports consisted of mineral products, 23 per cent of rubber. The import trade is mainly with Great Britain, Germany, and the United States. Manufactures of iron, cotton cloths, and refined sugar are the chief articles of import. On account of the small total value of the imports, a single large item, such as the importation of locomotives, may markedly affect the relative share of the three countries mentioned, so that the percentages of a single year are not necessarily typical. In 1911, Great Britain imported 21 per cent, Germany 18, and the United States 17 per cent of the total imports of Bolivia. The opening of the Panama Canal will undoubtedly increase the imports from the United States.

The surface formation of the country is not favorable to the development of a good system of communication. Most of the roads in the mountainous regions are intended only for pack animals, by which the internal commerce is principally carried on, and wagon roads are found only in the vicinity of the capitals of the provinces and other large cities. The cart roads of the country have a length of about 1430 miles. Of railways Bolivia had, in 1912, about 1500 miles, and quite a number of new lines are projected for the immediate future. The three principal lines have the Pacific for their objective: One leads from La Paz to Guayaquil on Lake Titicaca, where transshipment is made by boat to Puno at the other end of the lake, whence there is rail communication to the Peruvian port of Mollendo. The second, built in 1912, leads directly from La Paz to Arica. The third leads from La Paz via Oruro (branch to Cochabamba), Rio Mulatos (branch to Potosí) and Uyuni (branch under construction to connect with the Argentine system at La Quiaca) to Antofagasta. In the north the Brazilian line from Guayara-Mirim to San Antonio, completed in 1912, has given Bolivian rubber a direct outlet to the Amazon by avoiding the rapids of the Madeira River. Bolivia is connected by telegraph lines with Peru, Chile, and Argentina, and by cable with the United States and Europe. There are about 4000 miles of telegraph.

Government, Finance, etc. The government of Bolivia is a representative democracy, in which the executive power is vested in a president, elected directly for four years, who is assisted by a responsible ministry of six members. There are two vice presidents. Neither the president nor the vice presidents are eligible for two successive terms. The legislative authority is intrusted to a Congress consisting of a Senate of 18 members, elected for six years, and a Chamber of Deputies of 75 members, elected for four years. For administrative purposes Bolivia is divided into nine departments, which are subdivided into provinces and cantons, and a territory. The governors of the departments and the prefects of provinces are appointed by the president, and they, in turn, appoint the administrative officers of the cantons. Municipalities in each department are subject to supervision by the municipal council of the capital of the department. The Supreme Court, which sits at Sucre, consists of judges nominated by the Senate and elected by the Chamber of

Deputies. The republic has seven judicial districts, each containing a number of superior courts and inferior tribunals. Since 1892 military service has been compulsory for every able-bodied citizen between the ages of 21 and 50 years. The total strength of the Bolivian army is over 80,000 men, of whom only about 3150 belong to the standing army, the remainder being composed of reserves and territorial guards. The monetary standard is gold (since 1906); monetary unit, the boliviano, par value 38.932 cents (12.5 to the pound sterling). Revenue is derived chiefly from import and export duties, imports on mining, and stamps. Estimated ordinary revenue and expenditure for 1909, 13,300,000 and 16,454,625 bolivianos; for 1912, 17,237,100 and 17,350,552. Foreign debt in 1912, 21,937,805; internal debt, 4,208,069 bolivianos; floating debt, 2,034,959 bolivianos. For national coat of arms, see Colored Plate accompanying HERALDRY.

Education. Primary instruction is nominally free and compulsory, but the public schools, though increasing in number, are inadequate to the needs of the country, and illiteracy is prevalent. As reported for 1912, there were 990 primary schools (public and private), with 3960 teachers and 81,336 pupils; for secondary instruction, 21 colleges, 5 clerical institutions, and 5 private lyceums, with a total of 2177 students; for higher education, 19 establishments (including the universities at La Paz and Sucre), with 780 students.

Population. No census was taken in Bolivia from 1854, when the population was 2,326,126, of whom the whites and mestizos numbered only 634,000, until 1900, when it numbered 1,744,568. In 1910 it was estimated at 2,500,000. Indians make up 50 per cent of the whole, mestizos 20 per cent, whites 12 per cent, and unclassified 9 per cent. The Indians belong mostly to the Aymara and Quichua tribes, which have been partly converted to Christianity and are engaged in agricultural pursuits. In the southeast, in the Chaco, are found Indians of the Chiriguano and other tribes who are still uncivilized. Although the highland constitutes but three-tenths of the total area of the country it contains 86 per cent of its population. Here is the nucleus of the country's life; here is the seat of government and here lie the larger cities. La Paz, the capital, has 95,000 inhabitants; Cochabamba, 28,000; Potosí, 25,000; Oruro, 24,000; and Sucre, 22,500. Santa Cruz de la Sierra, which lies at the foot of the Andes, with 18,000 inhabitants, is the only city of consequence not on the highland.

History. The territory of Bolivia, which was subdued by Hernando Pizarro in 1538, constituted, under the name of the Audiencia of Charcas, a part of the viceroyalty of Peru till 1776, when it was annexed to the government of La Plata. Within 40 years after the conquest Spanish settlements were formed at Chuquisaca (Sucre), Potosí, La Paz, and Cochabamba, and numerous silver mines were opened, in which the Indian population was compelled to labor. So thoroughly were the natives subjugated that no important rising occurred till 1780, when Tupac Amari, a descendant of the ancient Incas, headed a formidable insurrection, which for a time threatened the destruction of the Spanish power in the region. The first revolutionary outbreak against the authority of Spain occurred at Chuquisaca (Sucre) in May, 1809, and was followed

in August by a rising of the inhabitants of La Paz. In 1810 an army from Buenos Aires came to the assistance of the patriots, but it was defeated at Huaqui by General Goyoneche, who put down the insurrection with great cruelty. For 15 years the country was devastated by a sanguinary guerrilla warfare, with several pitched battles, in which victory changed from side to side. More than once fresh Argentinian armies invaded Upper Peru, but no definite result was attained till 1824, when the Spanish army in Peru was crushed by the Colombian force under General Sucre. On Aug. 6, 1825, a Congress at Chuquisaca declared the independence of Upper Peru, and five days later the Republic of Bolivia was organized, embracing the provinces of Potosí, La Paz, Cochabamba, and Santa Cruz. A constitution drafted by Bolívar, the Código Boliviano, was adopted in 1826, and the presidency for life was offered to General Sucre, who held office for two years only. From the beginning, almost, of its national existence, Bolivia was plunged into a state of chronic revolution and civil war, from which it was relieved only at intervals by the absolute rule of some military leader. Of those presidents who succeeded in giving Bolivia breathing space for the development of its resources, mention may be made of Santa Cruz (1829-39), who in 1836 usurped the chief power in Peru and constituted it, together with Bolivia, a federal republic under himself as protector; Generals Belzu and Córdova, who were in power from 1848 to 1857, and José María de Acha (1861-64), in whose time treaties were concluded with the United States and Belgium, and some attempts made to foster the foreign trade of the country. By arrangements made in 1866 and 1874, the joint possession of Chile and Bolivia had been established over the rich nitrate fields of the desert coast of Atacama, but in 1879 Chile seized the Bolivian port of Antofagasta, and declared war against Bolivia and its ally, Peru (q.v.). In the Treaty of Nov. 29, 1884, Bolivia gave its assent to the retention by Chile of its seaboard with the rich mineral fields. In the fall of 1898 a revolution broke out, which after a half-year's fighting resulted in the overthrow of President Severo Fernando Alonzo and the elevation of José Manuel Pando to the presidency. During his administration a dispute arose with Brazil concerning the possession of the Acre region (See ACRE). It was settled in November, 1903, by the cession of about 70,000 square miles to Brazil in return for a money indemnity and small territorial compensations elsewhere. There was a long-standing dispute with Chile over the interpretation of the Treaty of 1884, Bolivia claiming that her cession of the littoral territory in that year was only provisional. A treaty ratified in December, 1904, recognized the perpetual dominion of Chile over the disputed territory, but granted Bolivia free access to the sea, with the right of erecting customhouses at designated ports. The treaty provided for the immediate construction of a railway from the port of Arica to La Paz at the expense of the Chilean government, the Bolivian section to be transferred to Bolivia after 15 years. Ismael Montes was elected President in 1904 for the term 1904-08. He was succeeded by Elhodoro Villazón.

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BOLKHOV, bol'-kof'. The capital of a district in the government of Orel, Russia, about 36 miles north of the city of Orel, and 200 miles from Moscow (Map Russia, E 4). It is an active, thriving town, trading to the amount of 1,500,000 rubles (\$150,000) annually, in hemp, grain, rapeseed oil, etc. It has several mills and factories, the annual produce of its tanneries is estimated at 530,000 rubles (\$270,000). A peculiar feature of the town is the location of its harbor, which is 12 miles distant in the village of Krutogorye, on the Oka River. Pop., 1897, 20,700.

BOLLAN, WILLIAM (?-1776). An English-American lawyer and political pamphleteer, born in England. He emigrated to Massachusetts about 1740, married a daughter of Governor Shirley, and through this connection obtained an appointment to the position of Advocate General. As the agent of Massachusetts in England (1745-48), he secured from the British government the repayment of the money advanced by that Colony to defray the expenses of the Cape Breton Expedition. In 1769 he obtained and sent to Massachusetts a collection of letters written by Governor Bernard and General Gage, strongly criticising and abusing the colonists. On the approach of the Revolutionary War he exerted himself with zeal and energy to effect a conciliation between the British ministry and the American Colonies. Among the numerous pamphlets written by him are *The Ancient Right of the English Nation to the American Fishery Examined and Stated* (1764), *The Mutual Interests of Great Britain and the American Colonies Considered* (1765), *Freedom of Speech and Writing upon Public Affairs Considered* (1760), *A Free Britan's Memorial in Defense of the Right of Election* (1769), and *A Petition to the King, with Illustrations Intended to Promote the Harmony of Great Britain and her Colonies* (1774).

BOLLANDISTS. An association or succession of Jesuits by whom the *Acta Sanctorum* (q.v.) are collected and published. They derive their name from their head, Jean Bolland, who was born at Tirlmont, Belgium, Aug. 13, 1596, joined the Jesuits in 1612, and was called to Antwerp in 1630 to edit and publish the materials for the lives of the saints which had been collected by the Jesuit Hubert Rosweyde, who had died the year before. Bolland chose as his collaborators Godfried Henschen and Daniel van Papenbroeck. The days of the saints, usually their days of death, were arranged chronologically, and so the lives follow this order, and several volumes are given to one month. The first volume appeared in 1643. Bolland died in Antwerp, Sept. 12, 1665. The work was carried on by those associated with the original company. Some of them are C. Janning (died 1723), P. Bosch (died 1736), C. Suyken (died 1771), I. Hubens (died 1782), A. Berthod (died

1788), and J. Ghesquière (died 1802). In 1773 the Jesuit order was suspended, and in 1775 the convent in which the Bollandists had lived was turned into a military school. It seemed as if their task must be abandoned; but in 1776 the Empress Maria Theresa came to their assistance and secured for them the Caudenberg Monastery in Brussels, and also for each Bollandist a modest pension. Her successor, the Emperor Joseph II, ordered that they should produce a volume yearly, and as it was impossible for them to do so, expressed such great dissatisfaction that in 1788 he forbade them to bring out another volume. In 1789 their library and all their materials were sold to the Premonstratensian Abbey of Tongerlo, not far from Antwerp, for 25,000 francs, and there the work was continued for a time. But in 1796, the French having invaded the country, the abbey was dissolved. The materials were not scattered, however. In 1825 they were removed to Brussels. In 1836 it was reported in Brussels that the work was to be continued in Paris. This so stirred the interest of the Belgians that the government passed a yearly subsidy of 6000 francs to insure the continuance of the work on Belgian soil; a new company of Bollandists was formed, and ever since the volumes have been coming out.

In 1882 a supplement to the volumes already published, and preparatory studies for those not yet in press, began to appear under the title *Analecta Bollandiana*. The principal collaborators on this series are De Smedt, Van Hooff, and De Backer. In addition, catalogues of the Latin manuscripts before 1500, and of the Greek manuscripts, in the National Library of Paris, have appeared. The extensive library of the Bollandists is now housed in the College of Saint-Michel, Brussels.

BOLLER, ALFRED PANCOAST (1840-1912). An American engineer, born at Philadelphia. Graduating from the University of Pennsylvania and from the Rensselaer Polytechnic Institute, he practiced as a consulting engineer in New York City almost continuously for more than 50 years. Bridges were his specialty. Among the works which he planned are the Albany and Greenbush bridge over the Hudson, the Thames River Shore Line bridge at New London, Conn., the Central bridge and viaducts over the Harlem River, and the Duluth and Superior Interstate bridge. He also served in an advisory capacity for New York City, the Wabash Railroad, and the Brooklyn Rapid Transit Company. His writings include *A Practical Treatise on the Construction of Iron Highway Bridges* (3d ed., 1876), and *The Thames River Bridge* (1890).

BOLLES, bōlz, ALBERT S. (1846-). An American lawyer, educator, and author. He was born in Montville, Conn. He studied law and was admitted to the Connecticut bar and in 1870 was elected judge of the Probate Court. He afterward edited successively the *Norwich Bulletin* and the *Bankers' Magazine* and for several years was professor of mercantile law and banking in the University of Pennsylvania. He was then, for eight years, chief of the Pennsylvania Bureau of Industrial Statistics and subsequently became lecturer at the University of Pennsylvania and at Haverford College. Among his publications are: *Financial History of the United States from 1774 to 1789* (1879); *Financial History of the United States from 1789 to 1860* (1883); *Financial History of*

the United States from 1860 to 1865 (1886); *Practical Banking* (1884); *Industrial History of the United States* (1878); *The Conflict between Labor and Capital* (1876); *The History of Pennsylvania* (1890); *American Finance* (1901).

BOLLES, FRANK (1856-94). An American author, born in Winchester, Mass. He received his law education in Washington, D. C., and at Harvard; gave himself up to literary work, became an editor of the *Boston Advertiser*, and finally secretary to Harvard University, where he labored successfully to aid poor students. He was also conspicuous as a writer of nature studies, somewhat in the manner of Thoreau (q.v.). In prose he produced the following works: *The Land of the Lingering Snow* (1891); *At the North of Bear Camp Water* (1893); *From Blomidon to Smoky* (1894); and, in verse, *Chocorua Tenants* (1898).

BOLLEY, HENRY LUKE (1865-). An American plant pathologist, born at Manchester, Ind. He was educated at Purdue University, there became instructor and assistant in biology, and also served as assistant botanist of the Indiana Agricultural Experiment Station in 1888-90. In the latter year he became professor of botany and zoölogy at the North Dakota Agricultural College and also botanist and plant pathologist of the government Experiment Station for North Dakota. He is known as the discoverer of the parasitic nature of potato scab and as originator of the methods used for its prevention, and is credited with the first use of formaldehyde upon seed grain to prevent smut of oats, wheat, and other cereal grain (1892-93). Besides having worked out the causes of "flax-sick" soil, and flax-wilt disease, and having originated disease-resistant varieties of this plant, he also developed a method of spraying grain fields in 1896 to destroy the weeds without injury to the growing crop. He is author of the *North Dakota Pure Seed Law of 1908*, and in 1909 he became seed commissioner for that State.

BOLL WEEVIL. See WEEVIL.

BOLLWORM, bōlwŭrm (*bōlz*, the round pod or capsule of cotton + *worm*). The widely destructive caterpillar of a noctuid moth (*Heliothis obsoleta* [arnigera]). "Of popular names," says C. V. Riley, who studied and wrote extensively upon it, "it has one for almost every plant upon which it feeds and for every country which it inhabits, and as it is almost cosmopolitan and a very general feeder, these names are many. Throughout cotton-growing States it is very generally known as the 'bollworm' when it occurs upon cotton; when it occurs upon corn it is called the 'cornworm' or 'earworm.' . . . In many of the Southern States it is known in the early part of the season as the 'cornbud worm.' When found upon tomatoes it is the 'tomato-worm.'" It is also known as the "bud worm" of tobacco and as the "tomato fruit worm" when it attacks the fruit of the esculent. It may produce two to seven broods in a season, and ranks among the most destructive and difficult; to combat of all injurious insects. The moth has an expanse of about 1½ inches; the general color of the upper surface varies from light greenish gray to a rich yellow-gray, almost tawny, and the markings vary much in intensity and size. The moths fly in the evening dusk, seeking the flowers of some suitable plant of the season, and depositing their eggs upon the surface of, or more often near to, the flower bud. When in-

dian corn is about to flower this plant seems preferred to anything else (save perhaps cotton) then available, and tomatoes with corn near them will be saved to a great extent by this preference. The egg hatches soon, and the young caterpillar begins to feed and to make its way steadily towards flower bud or boll, searching patiently for it until found, when it begins at once to feed there, destroying the essential parts of the unfolded flower of corn or other plant, or running the cotton boll, whether more or less advanced. "As the bollworms increase in size, a most wonderful diversity of color and marking becomes apparent. In color, different individuals will vary from a brilliant green to a deep pink or a dark brown, exhibiting almost every conceivable intermediate stage, and from an immaculate, unstriped specimen to one with regular spots and many stripes." In addition to their feeding upon this vegetable matter, these caterpillars are carnivorous, seizing and devouring each other whenever opportunity offers, and invariably doing so when shut up together in a breeding cage or traveling cage, until only one remains. At the end of about three weeks the worms drop to the ground, work their way several inches into the soil, and, spinning a mantle of silk about them, become reddish-brown polished pupae. In the warmer parts of the United States no less than five broods appear. It is the third or July brood which does most harm to the corn, and the fourth (August) brood that furnishes the bollworm proper and the greatest destruction to cotton, while "budworms" are those of the spring hatching. The fifth brood winters as chrysalis and maintains the race.

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BOLOGNA, bô-lô'n-ya (anciently, Lat. *Bononia*). A city of Italy, in Romagna, capital of the province of Bologna, situated in a fertile plain at the foot of the Apennines (Map Italy, F 3). The University of Bologna (qv) was founded in the eleventh century and was world famous as a school of jurisprudence. Industrially Bologna is of great importance. The products for which the city is especially famous are macaroni, Bologna sausages, liquors, and canned fruit. There are also large manufactures of silk, linen, glass, leather, and machinery. The commerce is considerable, and is greatly facilitated by excellent railway connections. Bologna is the seat of a court of appeals and of an archbishop, and the headquarters of a large army corps. The population of the city, including the suburbs, was 123,274 in 1881 and 172,628 in 1911.

The city was called in the early Middle Ages *La Dotta*, 'the Learned,' on account of its great university, or *La Libera*, from its democratic constitution, and later *La Grassa*, for the fertility of its soil and its wealth.

Architectural Features The town has not been generally rebuilt, and its narrow, irregular streets, numerous towers, and old palaces give it a mediæval aspect. In both the new and old

quarters the façades of most of the houses overhang the sidewalk, being supported on vaulted arcades. These arcades extend for miles in every direction, forming open galleries, protected from the weather, upon which all the shops open—an arrangement which never has been so thoroughly carried out in any other city. Many of these arcades date from the thirteenth to the sixteenth century, when the city was most flourishing, and illustrate both Gothic and Renaissance civil architecture in brick and terracotta. The finest are the portico of the Banconi (sixteenth century), under buildings by Vignola, and the portico of the Servi, built in 1312 by Manfredi. The later colossal portico of the Scalzi is 1700 feet long, with 167 arches. The longest of all the arcades is that leading from the city to the pilgrimage church of the Madonna di San Luca (1676-1739), with 635 arches, the distance is about a mile and a half.

The city is also remarkable for its churches, of which there are about 130, dating in unbroken succession from the eleventh century to the present. The earliest are the group of seven churches called San Stefano, dating from the eleventh and twelfth centuries, and unique in Italy as examples of simple Lombard brick architecture. This group includes a small basilica of SS. Pietro e Paolo, with early groin vaulting, originally the cathedral, the circular, vaulted church of San Sepolcro, built in imitation of the Holy Scripture (twelfth century), a well-preserved cloister, remarkable for its second-story arcades, usually destroyed in mediæval cloisters, an interesting subterranean church, and several other small churches and chapels, with monastic buildings, the whole being connected by numerous passages. In the thirteenth century Bologna was one of the important centres of the great religious revival emphasized by the two mendicant and preaching orders of St. Francis and St. Dominic. The churches of San Domenico and San Francesco were among the first erected by these orders (c. 1230-30), and among the earliest examples of Gothic architecture in Italy—earlier than their rivals in Venice and Florence, but that of San Domenico was completely remodeled internally in the eighteenth century in a cold classic style with domical vaulting. Other Gothic churches are the Madonna dei Servi, and, above all, the colossal church of the national patron, San Petronio, designed in 1390 to be the largest church in Italy. It was never completed as planned, only the nave and aisles being built (383 × 171 feet), without the transept with its central dome, or the apse, which would have made a structure surpassing the cathedral of Florence in size. The details are on so large a scale, with only twelve piers to support the arches and vaulting, that the real size is not at first apparent. The Gothic tracery of the large windows is the finest in Italy, and the sculptures on the façade doorways, by Giacopo della Quercia, are among the most interesting works of the earliest Renaissance. The finest work of Gothic sculpture in the city is the shrine of San Domenico (1267), by Giovanni Agnelli, from the designs of Nicola Pisano, the upper part by a Renaissance artist, perhaps Michelangelo. The churches are full of interesting Gothic sepulchral monuments of the old university professors, with reliefs representing them teaching their classes, while other monuments stand in the

streets under stone canopies and represent men of political note, in the same style as that which prevailed in Padua, Verona, etc.

Remains of fortified feudal palaces are numerous, the most imposing being the leaning tower of the Asinelli family, built in 1109, and 320 feet high, and that of the Garisendi family, of 1110, 163 feet high. The latter is 10 feet out of the perpendicular and is mentioned by Dante (*Inferno*, xxxi, 136), who compared it to the giant Anteus. Bologna had 180 such towers in the Middle Ages. There are also many quaint houses of the thirteenth century, combining wood and brick, and from this period date the two great palaces of the ancient republic, the Palazzo del Podestà, famous as the place where King Enzo, son of Emperor Frederick II, was imprisoned, and the Palazzo Pubblico, for the general popular assemblies; as well as such large private houses as the Palazzo Pepoli, with its great court; the Palazzo Malvasia, and the Loggia dei Mercanti, all of Gothic architecture. Bologna was then one of the foremost of free communes.

It is probable that most of the best mediæval works of art in Bologna were by artists from other cities; for Bologna was not greatly active artistically until the Middle Renaissance, but was given over to the pursuit of wealth. Nevertheless, there is originality in its arcades and in its use of terra-cotta decorations of brick constructions. It was late in adopting the Renaissance, and then (c.1500) it used terra-cotta work most effectively in the new style. As in the arcades of S. Giacomo Maggiore, the fine doorway of the Corpus Domini, and in the early and singular façade of San Spirito (1460?). Among the Renaissance churches are the Certosa, Corpus Domini, Madonna di Galliera, S. Michele in Bosco, and the interiors of S. Domenico and S. Giacomo Maggiore. The cathedral is a sordid Baroque edifice of no merit. Bologna is also remarkable for its fine Renaissance palaces. Such are the Palazzi Fava, Bolognini, Malvezzi, Bevilacqua, and Bentivoglio, and the latter part of the Palazzo del Podestà. More classic and later Renaissance buildings are the Malvezzi Medici Palace, and the old University (now library), by Terribilia with a remarkably fine court. In civil Barocco architecture, Tibaldi distinguished himself in the Magnani Palace and the present University building (1577).

History. According to legend, Bologna was founded about the eighth century B.C. by a colony of Etruscans, and was then called Felsina. Several necropolises, especially that called Villanova (q.v.), have yielded testimony to early occupation of the neighborhood of Bologna, but the civilization revealed by them is believed to be Umbrian and to antedate the Etruscan conquest. Many of the objects found in the tombs are of archaeological interest. They are exhibited at the Museo Civico. Felsina was long the most important Etruscan city north of the Apennines. It was conquered by the Gallic tribe of the Boii as early as 196 B.C., and was called by them Bononia, the name it has since retained. Having espoused the cause of Hannibal, it was conquered by the Romans, who made it a colony in 189 B.C. Through its position on the Æmilia Via (q.v.), on the road to Arretium (see AREZZO), and on that to Aquileia (see AQUILEIA), it became one of the most important cities of Italy. In 90 B.C. Roman citizenship was granted

to Bononia. Antony and Augustus both settled colonists here. The aqueduct built by Augustus has been in use again since 1881. Bononia remained a city of great importance under the Empire. It successfully resisted Alaric (q.v.) in 410 A.D. After the fall of the Western Empire, Bologna was annexed, with its territory, to the Exarchate of Ravenna. It passed to the Lombards on the fall of the Byzantine Exarchate, but was soon made a free city by Charlemagne. The Imperial charter of 1112 recognized its right to elect its own magistrates, and from that time the city became noted for its strongly organized guilds and its thorough democratic spirit, which went so far as to exclude the nobility from office, as in Tuscany. Bologna acquired world-wide fame during the Middle Ages through its university. Under Imperial protection it became the greatest centre of learning in Italy, and the expounder of Roman law. (See INNERBUS; BOLOGNA, UNIVERSITY OF.) The Archaeological Museum (Museo Civico) is one of the most important in the country. It is rich in treasures from the Villanova and the Etruscan periods, and in medals, illuminations, and sculptures of the Renaissance. The Academy of Fine Arts contains Raphael's famous "St. Cecilia"; otherwise it is chiefly remarkable as illustrating the local Bolognese school, not only the earlier men, like Francia, but especially the school of the Carracci (q.v.). Bologna possesses also one masterpiece of Barocco sculpture in the colossal statue of Neptune by Giovanni Bologna on the Giant's Fountain. Earlier sculptures of considerable merit are scattered through the churches.

The political history of Bologna after the adoption, in the twelfth century, of its democratic communal institutions shows at first a predominance of the Imperial or Ghibelline party; but after a long and sanguinary contest between democratic Guelphs and aristocratic Ghibellines the former triumphed. The city then fell into the arms of the papacy. Direct papal rule was imposed by Cardinal Albornoz and Pope Julius II, resulting in the loss of the city's liberties and the decline of its prosperity (1506). Here Leo X and Francis I met in 1515; here Charles V was crowned in 1530 by Clement VII. Bologna remained a part of the papal territory until 1796, when it was taken by the French troops under Augereau and made by Napoleon the capital of the Cispadane Republic. It reverted to the Papal States in 1815, but became a hotbed of revolutionary and national movements, such as those of 1831 and 1849. In the latter year it was taken by the Austrians, who held it until the war of 1859, when the defeat of Austria by France and Sardinia made an Italian kingdom possible. The Bolognese, by an overwhelming vote (1860), decided for annexation to the dominions of Victor Emmanuel.

Consult: Muzzi, *Compendio della storia di Bologna* (Bologna, 1875); Ricci, *Guida di Bologna* (Bologna, 1900); Burton, *Etruscan Bologna* (London, 1876); Taine, *Italy* (New York, 1877); Hare, *Cities of Italy* (London, 1884); Tuckerman, *Italian Sketches* (New York, 1891); James, *Bologna* (London, 1900).

BOLOGNA, GIOVANNI (the Italian form of his original name, JEAN BOULOGNE; Giovanni da Bologna is incorrect) (c.1524-1608). One of the most important sculptors of the Italian Renaissance. He was born at Douai, France, the son of a wood carver of the same name.

Little is known of his youth, but he studied sculpture under Jacques Duboucq at Mons. About 1554 he went to Rome, where he was unquestionably influenced by Michelangelo. Two years later, on his return, he stopped at Florence, where he won the friendship of Bernardo Vecchietti, who brought him the patronage of the Medicean dukes. About 1560 he was made their official sculptor, and he remained in their services until his death, April 13, 1608. In his best work Giovanni Bologna was the most remarkable sculptor of his day, Cellini being his only real rival. Although sometimes arbitrary in his treatment of form, he was a thorough master of technique, both in bronze and marble. His composition is bold and striking, and he is a master in the representation of movement. His latest works, however, scarcely excel those of his contemporaries. The most popular of his figures, the bronze "Flying Mercury" (c1564), is also his best. The delicately poised and graceful god is represented as just alighting and rushing forward. It was formerly in the gardens of the Villa Medici, where it showed to greatest advantage, but is now in the crowded Museo Nazionale (Florence). His other masterpiece is the marble group, "The Rape of the Sabinæ," completed in 1583—a remarkable piece of technical bravure, designed to show the sculptor's mastery of his art. A whole volume of verse was written in its praise. The relief of the pedestal representing the same subject is one of his very best. His other works include the marble group "Firenze" (1567-76), in the Museo Nazionale, "Apennino" or "Jupiter Pluvius," a colossal figure of 32 meters high, hewn from the living rock by his pupils after his design, a bronze "Venus" in the Villa Petraea, and the simple and stately equestrian statue of Duke Cosimo I in Florence (1604), which inspired Browning's "The Statue and the Bust." His fountains are masterpieces of their kind and surpass anything of his day. The principal are the fountain of "Neptune" in Bologna (1533-66), and those of "Oceanus," with three river gods (1576), and the "Bathing Woman Observed by Fauns" (1587), both in the Boboli Gardens. Among his late works are "Hercules Slaying the Centaur" (1599, Loggia dei Lanzi), the statue of Ferdinand I for his tomb in the Medicean Chapel, the fine bronze statue of St. Luke on the façade of Or San Michele (1602), the statue of Henry IV of France, destroyed during the Revolution. The celebrated portals of the cathedral of Pisa, long attributed to Bologna, have been shown by modern research to be the work of his pupils. He was the head of a numerous and important school, which he employed in executing his designs. Practically all of the small bronzes attributed to him and found in most important collections, were modeled and cast after his drawings. Consult Desjardins, *Vie et œuvre de Jean Boulogne* (Paris, 1901), Patrizi, *Il Gram-bologna* (Milan, 1905), De Bouchard, *Jean de Bologne* (ib., 1906).

BOLOGNA, UNIVERSITY OF One of the oldest and most famous universities in the world, though Paris, if not older, rivals it in antiquity, and Salerno had a school of medicine at a very early date. The origin of all these foundations is obscure. A school of law existed in Bologna in the eleventh century, and out of this the university grew, although the faculties of medicine and of the liberal arts did not come into promi-

nence before the fourteenth century. The earliest statutes date from 1317, with the faculty of law as the first and most famous department. In the early half of the twelfth century Irnerius, the famous teacher of the Civil Law, brought great renown to Bologna, which was augmented by the subsequent publication of the great *Decretum* or *Digest* of the Canon Law, compiled by Gratian, one of the doctors of the university. For the first time the church had its body of laws comparable with those of the state, and the *Corpus Juris Canonici* took its place by the side of the *Corpus Juris Civilis*, and both these epoch-making works are among the glories of the University of Bologna. Favored in its earlier years by the emperors for its knowledge of the civil law, which was of great value to the Empire, it was favored by the popes in later times for the service rendered to the papacy by the *Digest* of the Canon Law. In 1360 Innocent VI established here a school of theology. The university profited not less by private than by public benefactions, and rose to remarkable prosperity in the later Middle Ages. Among its students were Dante, Petrarch, and Tasso. The number of students is said to have reached 10,000. Its organization was probably a guild of students or scholars as opposed to the other medieval form, a guild of masters, such as prevailed in Paris. As early as 1158 these received a charter of privileges from Frederick I known as the *Authentica Habita*. The students were divided according to nationalities, and these were again subdivided. At first, as elsewhere, four nations seem to have existed, but later, after much subdivision, two great organizations emerge—the Citarantani or Italians and the Ultramontani or foreigners—each with its own officers and administration. One of the notable features of the later history of Bologna was its admission of women, as early as the eighteenth century, both as students and instructors, among the latter being Novella d'Andrea, Laura Bassi, Mme. Mazzolini, and Clotilda Tambroni. The study of anatomy has been here promoted by many illustrious teachers—Vesalius among the number, and it was here that Luigi Galvani made the famous discovery which perpetuates his name. At present Bologna has about 2000 students, and comprises faculties of philosophy and letters, physical, mathematical, and natural science, jurisprudence, medicine and surgery, pharmacy, veterinary surgery, an engineering school, a school of drawing and architecture, and a school of agriculture. The library (of which Cardinal Mezzofanti, the celebrated linguist, was once librarian), founded in 1605, contains 255,000 volumes, 48,000 pamphlets, 5000 manuscripts, and 880 incunabula. The university celebrated its eighth centenary in June, 1888. See GRATIAN, CANON LAW, CIVIL LAW, ETC.

BOLOGNA STONE A radiated or globular variety of the mineral barite. It was originally obtained from a bed of clay in Mount Faterno, near Bologna, Italy, and attracted considerable attention because of the phosphorescence which it exhibited when thrown into a fire in the presence of charcoal. The mineral, when heated with powdered charcoal, is partially reduced to barium sulphide, which, if sealed up in glass tubes after exposure to the sun's rays, will phosphoresce in the dark with a brilliant orange-colored light. This has been long known as *Bologna phosphorus*, and has been used as a

luminous paint for coating clock faces, match boxes, etc.

BOLOGNA VIAL, or **FLASK** (first made in Bologna). A short, thick, narrow glass vessel, closed at one end, and open at the other, which the glass blower prepares from each pot of the melted mixture before employing it in the fashioning of tumblers, glasses, bottles, etc. (See **GLASS**, **ANNEALING**.) It serves the purpose of enabling the glass manufacturer to judge of the color and other conditions of the fused glass or metal; and as the jar is not subjected to annealing, it is very friable, and a small angular fragment of any mineral allowed to drop into it at once causes it to fly in pieces. It will be noticed, however, that a Bologna flask will bear a very heavy blow on the outside without being fractured.

BOLOGNESE, *Il*, el bō'lō-nyā'za. See **GRIMALDI**, G. F.

BOLOGNESE (bō'lō-nyēs' or nyēs') **SCHOOL OF PAINTING**. The name usually applied to the Eclectic school, founded by the Carracci (q.v.) at Bologna about 1580. Like the contemporary Naturalist school, it was a reaction against the Mannerists of the sixteenth century, which imitated, in a meaningless manner, the forms of Michelangelo and Raphael. The Eclectic school of Bologna was the mother of modern schools of design. Its programme was to unite the best points of the principal schools of the Italian Renaissance: Michelangelo's form, Titian's color, Correggio's light and shade, and Raphael's symmetry and grace. The result of such training was a certain technical skill, but a lack of originality. The school also placed weight upon the study of nature, especially from the nude, but not to the same extent as the Naturalists, by whom it was much influenced. Its most important representatives will be found treated under the titles **CARRACCI**; **RENI**; **GUIDO**; **DOMENICHINO**; **ALBANI**; **FRANCESCO**; **GUERCIANO**; **GIOVANNI F. B.** The best modern treatise on the Bolognese school is "Die Malerschule von Bologna," in *Dolme, Kunst und Kuntster Italiens*, vol. iii (Leipzig, 1879). Consult also *Bolognini-Amorini, Vite dei pittori ed artefici Bolognesi* (Bologna, 1843). Contemporary accounts are those of *Malvasia, Felsina pittrice* (Bologna, 1678; new ed., 1841); *Baglione, Le vite dei pittori dal pontificato del Gregorio XIII* (Rome, 1649).

BOLOMETER (*Gk.* βολή, *bolē*, a throw, sunbeam + μέτρον, *metron*, measure). An instrument invented by Prof. S. P. Langley for the detection of minute changes in temperature, particularly those due to the absorption of radiant energy, and for a comparison of quantities of energy absorbed. It consists essentially of a balanced Wheatstone's bridge (q.v.), through which a feeble current is passing; one "arm" of this bridge is composed of three strips of platinum blackened and exposed to the radiation, e.g., from the sun; the temperature of this arm rises, its electrical resistance increasing; the balance of the bridge is thus destroyed, and there is a sudden deflection of the galvanometer needle, varying with the amount of energy absorbed by the arm of the bridge. This instrument was used originally by Langley in his investigation on the radiation from the sun; and within recent years, particularly in Langley's Astrophysical Observatory at the Smithsonian Institution, Washington, the bolometer has proved to be one of the most useful and reliable

instruments for the study of radiation. The instrument is described in vol. xvi of the *Proceedings of the American Academy of Arts and Sciences*, p. 342 (Boston, 1881), and in the *Annals of the Astrophysical Observatory of the Smithsonian Institution*, vol. i (Washington, 1900); *Goblentz, "Instruments and Methods used in Radiometry," United States Bureau of Standards, Bulletin No. 3*, vol. iv (Washington, 1907).

BOLONDRON, bō'lōn-drōn'. A town of Cuba, in the province of Matanzas, about 35 miles southeast of Matanzas by rail (Map: Cuba, D 4). Pop., 1899, 9528; 1907, 12,377.

BOLOR-TAGH, bō-lōr' tag' (Turk. *bolud*, snow cloud + *dagh*, *tagh*, mountain; cf. *Ben-Nevis*). A name formerly given to a mountain range supposed to extend in a north and south direction along the eastern edge of the Pamir Plateau connecting the Himalaya, Karakoram, Kuen-lun, and Tian-Shan ranges. The Kizil-Yart Range, attaining in the peak of Mustaghata an elevation of nearly 26,000 feet, may perhaps be taken to represent the Bolor-Tagh.

BOLSENA, bōl-sā'na (anciently, *Volsiniū*). An Italian town in the province of Rome, situated on the north shore of the lake of Bolsena (*Lacus Volsiniensis*), about 20 miles north-northwest of Viterbo. It was one of the 12 great cities of the Etruscans, but is now a town of little importance. The miraculous bleeding of the Host in the hands of a doubting priest at Bolsena in 1263 caused the institution of the festival of the Corpus Christi, celebrated the Thursday following the first Sunday after Pentecost. The incident has been treated by Raphael in a fresco now in the Vatican. Half a mile from Bolsena are a few traces of the Etruscan city, and many fragments of the Roman one remain. The lake of Bolsena is a fine expanse of water, about 10 miles long and 8 broad, and is supposed to be the crater of an extinct volcano. The Marta River carries its waters into the Mediterranean. It has two islands, Bisentina and Martana, which were favorite retreats of Pope Leo X. Martana is famous as the scene of the exile and murder of the Gothic Queen, Amalasuntha, by her husband, Theodahad.

BOLSTER, bōl'stēr (akin to Eng. *dole*, stem, *bowl*, hollow vessel). A piece of soft wood covered with canvas, placed on the trestletree of a vessel for the eyes of the topmast rigging to rest upon and thus prevent the injury to them which would result from being bent downward at a sharp angle. Pieces used for similar purposes elsewhere are also called bolsters; and the name is applied to cushions of tarred canvas and rope which are used to prevent the stays from being chafed when the ship pitches.

BOLSWARD, bōl'svārt (anciently, *Lat. Bol-verda*). An old town in the province of Friesland, Holland, 20 miles southwest of Leeuwarden (Map: Netherlands, D 1). It is surrounded by a navigable canal. The church of St. Martin, in the Gothic style, is the largest and handsomest in Friesland. Bolsward's trade is considerable, and its principal manufactures are bricks and pottery. The town was a member of the Hanseatic League in the Middle Ages. Pop., 1900, 6500; 1910, 7215.

BOLT. A specially constructed metallic pin for fastening together temporarily or permanently parts of structures or machines. Bolts for doors, windows, chests, drawers, etc. are employed to fasten temporarily the objects to

which they are applied and are thrown into and out of use by keys or by means of the hand Bolts for permanent fastenings are of various kinds and are given various names, according to their form or the use to which they are put, thus we have round, square, hook, and eyebolts as examples of bolts named according to their form, and we have foundation, rail, tire, shackle, and other bolts named from the use to which they are put. Expansive bolts are arranged so that when screwed into a hole as in a wall the forward movement causes movable and surrounding pieces to increase the diameter and bear firmly against the interior surface of the opening, thus enabling beams or other structural parts to be strongly attached. The most common form of bolt is that having a head at one end and a screw thread at the other. The threaded end is sometimes screwed into the last of two or more parts, but more generally it projects through, and a suitably fitting nut is screwed on to the projecting end. This form of bolt is made by passing heated rods of iron into a machine which automatically cuts off the proper length for a single bolt, and forges a head on one end by pressure, and the blanks thus formed are then threaded in other machines, the heated rods are fed continuously, and the bolts are forged and threaded with astonishing rapidity. Bolts of complicated shape and bolts of larger size for special purposes are forged by ordinary blacksmith work.

Metal bolts used on board ship are called *through bolts* if they extend completely through a part of the structure, and *blind bolts* if only extending part way through. Bolts having a hole in the projecting end are called *eyebolts*, *ringbolts* have a ring through the eye. *Lewis bolts* consist of an eye with a tapered lug on one side which fits in a socket in the deck, where it is firmly held by a wedge or key inserted behind it, these bolts are used in the decks where an eyebolt is needed, but where it is undesirable to have any projection extending permanently above the surface.

BOLT COURT One of the odd retreats in London, just beyond St. Bride's Church, off Fleet Street, associated with Dr. Johnson, who lived there for several years, and with Cobbett.

BOLTI, *bôl'ti*, or **BULTEE** (Ar. *boltuy*) A chichlid fish of the Nile (*Tilapia nilotica*), esteemed as food.

BOLTING CLOTH (ME *bulten*, OF *bultier*, *buleter*, Fr. *bultier*, from LL *buletare*, to sift, from LL *burra*, a coarse cloth, of It. *buratto*, sieve). A fine fabric, usually made of unsized silk and employed as a sieve in separating the products of flour mills. See **GAUZE**, also **FILOUR**.

BOLTON, *bôl'ton*, or **BOLTON-LE-MOORS** (from the moorlands where it is situated). An important manufacturing town in Lancashire, England, on both banks of the Croal, 11 miles northwest of Manchester (Map England, D 8). It is one of the principal seats of the cotton manufacture in England, its spinning factories alone employing over 20,000 workmen. In addition there are large foundries and iron works, bleaching and dye works, paper mills, soap factories, and silk-weaving establishments and coal mines in the vicinity. The municipal enterprise of the town in no way lags behind its industrial activity. Its water works were municipalized as early as 1847, it owns and operates the gas works, an electric plant, the electric street

railways, and maintains ice houses, markets, and slaughterhouses, all of which yield a substantial income after covering all expenses of maintenance, interest, and amortization, and saving immense sums of money to the citizens and the city treasury in lower charges. Even the sewage is utilized in connection with a sewage farm maintained by the city for that purpose. The public baths, numerous recreation grounds and parks, a higher-grade board school, technical and art schools, five public libraries, and two museums are the results of the city's efforts on behalf of its people. It was incorporated in 1838 and was made a county borough in 1888. It returns two members to Parliament. Pop., 1891, 146,487, 1901, 168,205, 1911, 180,885.

The history of Bolton since very early times is almost entirely industrial. Flemish immigrants in 1337 laid the foundations of the woolen manufactures, and this was further stimulated by the arrival of French Huguenots towards the end of the seventeenth century. Here velvets were first produced, in about the middle of the eighteenth century, and muslin and cotton quiltings about ten years after. The inventions of Arkwright and Crompton, who were natives of Bolton, naturally revolutionized industry there, though the new machines were met at first with great disfavor. During the Civil War the town was stormed by the Earl of Derby and Prince Rupert (1644). Lord Derby was executed here in 1651.

BOLTON, BENJAMIN MEADE (1857-) An American bacteriologist, born at Richmond, Va. He was educated at the University of Virginia, South Carolina College, and the universities of Heidelberg, Göttingen, and Berlin. After two years' work as assistant at Johns Hopkins he became professor at South Carolina College in 1888, director of the bacteriological department of Hoagland Laboratory in 1889, and then associate at Johns Hopkins in 1892. In 1895-96 he was director of the laboratory of the Board of Health, Philadelphia, in 1896-97 professor at the University of Missouri, and thereafter expert in experimental therapeutics at the Bureau of Animal Industry, Washington. Bolton is known for his extensive researches in bacteriology and experimental medicine. He published *The Bacteriolytic Power of the Blood Serum of Hogs* (1907) and *Hygienic Water Supplies for Farms* (1908), bulletins of the United States Department of Agriculture.

BOLTON, CHARLES KNOWLES (1867-) An American librarian and antiquarian, born in Cleveland, Ohio. He graduated at Harvard University in 1890, became librarian at Brookline four years later, and librarian of the Boston Athenæum Library in 1898. He wrote on the history of American libraries, especially in Boston and Cambridge, on special collections in American libraries, on posters, and on library administration. Among his books are *Sasha, the Wife of Rembrandt* (1893), *Brookline, History of a Favored Town* (1897), *The Private Soldier under Washington* (1902), and with his mother, Sarah Knowles Bolton (q.v.), *From Heart and Nature* (1902). He edited Lord Percy's *Letters from Boston and New York in 1774-76* (1902) and *The Athenæum Centenary* (1907), and in 1913 published *The Elizabeth Whitman Mystery at the Old Bell Tavern in Danvers*.

BOLTON, HENRY CARRINGTON (1843-1903)

An American chemist, born in New York City. He graduated at Columbia University in 1862, studied at Göttingen, and in 1872-77 was an assistant at the Columbia School of Mines. In 1877 he was appointed professor of chemistry and natural science at Trinity College. He was elected in 1900 president of the Chemical Society of Washington, D. C. His more important investigations have been made in connection with the action of organic acids on minerals. His publications include: *The Student's Guide in Quantitative Analysis* (1879); *An Account of the Progress of Chemistry* (4 vols., 1883-89); *The Scientific Correspondence of Joseph Priestley* (1892); *A Catalogue of Scientific and Technical Periodicals* (1897); *The Evolution of the Thermometer, 1592-1743* (1900); and *A Select Bibliography of Chemistry, 1492-1902* (1904). Dr. Bolton also made a study of comparative folklore, on which he published a number of monographs. Consult D. S. Marten, "Henry C. Bolton" in *Annals of the New York Academy of Sciences*, vol. xvi (1905).

BOLTON, SARAH KNOWLES (1841-). An American author, born in Farmington, Conn. She was at various times associate editor of the *Congregationalist*, assistant corresponding secretary of the National Woman's Christian Temperance Union, and vice president of the American Humane Education Society. She wrote: *Orlean Lamar and Other Poems* (1863); *How Success is Won* (1884); *Poor Boys who Became Famous* (1885); *Social Studies in England* (1886); *Famous American Statesmen* (1888); *Famous English Statesmen* (1891); *Famous Givers and their Gifts* (1896); *European Artists* (1902); *Emerson* (1904); *Raphael* (1904); *The Harris-Ingram Experiment* (1905); *Famous American Authors* (1905); *Memorial Sketch of Charles E. Bolton* (1907).

BOLTRAFFIO, bol-traff'fyo, GIOVANNI ANTONIO. See BELTRAFFIO.

BOLTROPE. The rope sewed on the edges of sails to strengthen them and prevent them from tearing. When on the perpendicular edge of a sail, it is called the *leech roping*; along the bottom of a sail, the *foot roping*; along the top, the *head roping*. Some sails, owing to their shape, have no head roping. All cordage employed in furling, loosing, or setting a sail, if attached to it at all, is, except the bunt whip, fastened to the boltrope.

BOLTZMANN, bolts'mán, LUDWIG (1844-1906). An Austrian physicist, born in Vienna. He studied in Vienna, Heidelberg, and Berlin; was appointed professor of physico-mathematics at the University of Graz in 1899, and in 1873 professor of mathematics in Vienna. From 1876 to 1890 he held the chair of experimental physics in Graz, from 1890 to 1895 that of theoretical physics in Munich, and from 1895 to 1900 that of theoretical physics in Vienna. In 1900 he was appointed professor of physics at the University of Leipzig and in 1902 was recalled to Vienna. He made valuable researches in connection with thermo-dynamics, the kinetic theory of gases, and other physical problems, and published *Vorlesungen über Maxwell's Theorie der Elektrizität und des Lichts* (2 vols., 1891-93); *Vorlesungen über kinetische Gastheorie* (2 vols., 1896-98); *Vorlesungen über die Prinzipie der Mechanik* (2 vols., 1897-1904); *Populäre Schriften* (1905).

BOLTUS, Dr. A character in a humorous

poem of the same name, by the younger Colman. It appeared in a volume entitled *Broad Grins*.

BOLY. See BOLZ.

BOLYAI, bôlyô-e, FARKAS (German, WOLFGANG) (1775-1850). A Hungarian mathematician. He was born in Bolya, spent his early years of study in Enged, Klausenburg, and Jena, and later studied three years (1796-99) in Göttingen. Here he formed an enduring friendship with Gauss, who was attracted to him by his profound thinking and excellent character. In 1804 he was made professor of mathematics in the Reformed College of Maros-Vásárhely, where he remained 47 years. In common with his friend Gauss, with Saccheri, Lambert, and numerous other mathematicians, Bolyai made many efforts to prove Euclid's postulate of parallelism. But it was reserved for his son, János (John), to declare the *science absolute of space*, which assigns Euclidean geometry to a particular kind of space. The chief work of the older Bolyai, known as the *Tentamen*, contains an appendix of 26 pages to vol. I, entitled *Scientiam Spatii Absolutis Veram Exhibens*. This little monograph, now so famous, is the work of János.

BOLYAI, JÁNOS (1802-60). A Hungarian mathematician, son of the above, was born in Klausenburg. He was a spirited boy, and, partaking of his father's mathematical genius, his progress was marvelous. He finished the Latin school at the age of 12, passed the philosophic curriculum in two years, and entered the Academy of Engineers in Vienna. In 1823 he was appointed lieutenant at Temesvár, from which place, Nov. 3, 1823, he wrote to his father in positive terms of his conception of parallels: "From nothing I have created another wholly new world." This conception, as formulated by him, became the appendix of the *Tentamen*. His later works, mostly unfinished, as the *Principia Doctrinae Nova Quantitativum*, add little to his fame. Consult: Baltzer, *Elemente der Mathematik* (Dresden, 1866); Schmidt, in *Abhandlungen zur Geschichte der Mathematik*, vol. viii (Leipzig, 1895); Halsted, *Bolyai-Non-Euclidean Geometry* (Austin, 1896); Bonola, *Non-Euclidean Geometry* (Chicago, 1912).

BOLZANO, bôl-tsa'no, BERNHARD (1781-1848). An Austrian theologian, philosopher, and mathematician. He was born in Prague, was ordained priest in 1805, and was appointed professor of the philosophy of religion at the university there. In 1820 he was removed on account of his liberal teachings, for which he had been denounced in Rome by the Jesuits, and henceforth devoted himself to his literary labors. As a philosopher he was a devoted adherent of Leibnitz, but was also influenced by Kant. He was a mathematician of remarkable ability and was one of the formulators of the present theory of functions. His most important works are: *Athanasia* (1827); *Lehrbuch der Religionswissenschaft* (4 vols., 1834); *Versuch einer neuen Darstellung der Logik* (4 vols., 1837); *Paradoxien des Unendlichen* (1851). Consult his *Autobiography*, ed. by Feisl (Vienna, 1875), also Palágy, *Kant und Bolzano* (Halle, 1902), and Schwarz, *Bolzanos Vorstellungstheorie und Kants Lehre von der Raumanschauung* (Göttingen, 1911).

BO.MA. The capital of Belgian Congo, Africa, situated on the Congo River, about 50 miles from the coast (Map: Belgian Congo, B 4). It has a residential section, containing the government buildings, and a business section.

The Congo is navigable for seagoing vessels as far as Boma, regular steamship communication being maintained with Antwerp. Boma is the chief shipping point of the bananas grown in the country. As a junction point of common routes it was at one time the centre of the slave trade in the Congo districts. In 1906 it became the seat of the American consul general.

BOMARSUND, bö'mar-sönd (Scand. *bomar*, rail, bar, bolt + *sund*, strait), STRAIT OF A channel in the Baltic Sea, at the entrance to the Gulf of Bothnia, between Verde and the islands of Åland and Bardo (Map Russia, B 2). The Russian fortress of Bomarsund, on the island of Åland, was taken on Aug. 16, 1854, by the Allies, and its fortifications destroyed. By the Treaty of Paris Russia must not rebuild the fortress.

BOMB, böm or büm (Fr. *bombe*, from Lat. *bombus*, Gk. *βόμβος*, *bombos*, a booming, humming), refers to the noise made by the projectile), **BOMBSHELL** and **SHELL**. A hollow ball of cast iron or steel filled with combustibles and shot, designed, on the explosion of the shell, to scatter in every direction. When first used, bombs were fired from mortars only, but since the invention of shell guns and other modern artillery the name *shell* has been gradually substituted. See **AMMUNITION**, **ARTILLERY**, **ORDNANCE**, **PROJECTILES**.

BOMB. In geology, a rounded mass of lava, from a few inches to two or three feet in diameter, usually formed by chilling of the mass in the course of its flight through the air. The round form is ascribable to the rotatory motion imparted by the violent ejection of the lava from the volcanic vent, it is sometimes modified by a flattening on opposite sides which mark the poles of the axis of rotation. The outer portion of a bomb which has cooled most quickly consists of a shell of dense or glassy character, while the interior is of porous nature or may be hollow. The shell in some instances is traversed by fractures which resemble those of a bread loaf and are caused by strain from the imprisoned gases. Bombs of this character are known as bread-crust bombs. A form similar to that of the bomb may be assumed by lava in its flow down the slope of a volcano, as has been remarked in the eruptions of Vesuvius.

BOM'BA (It. *bomb*). A nickname given to Ferdinand II, King of the Two Sicilies, in consequence of his fierce bombardment of the principal cities of Sicily in 1849.

BOMBARD'. See **ARTILLERY**, **ORDNANCE**.

BOMB'ARD. A wood wind instrument having a double reed, and belonging to the family of shawms (qv). It is the precursor of the modern bassoon (qv). It was built in four sizes known as contrabass, bass, tenor, and alto bombard. The unwieldy length of the two lowest kinds (6-7 feet) led during the sixteenth century to the doubling of the tube, whence the name *fagotto*.

BOMB'ARDIER (Fr. *bombardier*, It. *bombardiero*, for derivation, see **BOMBARDMENT**). A military title used in the British artillery. Acting bombardier is the first rank above gunner or driver, and bombardier the rank immediately higher. It is an appointment of the major commanding the battery, and, unlike the rank of sergeant, which can only be taken away by a regimental court-martial, may be canceled at any time by the commanding officer.

BOMBARDIER BEETLES (for origin of

name, see *Below*). Ground beetles, *Carabidae*, of the genus *Brachinus*. They are black, green, or blue beetles, with reddish-yellow legs. They live on the surface of the ground, and when closely pursued by an enemy, such as a predatory beetle, they discharge from the anus, with an explosive sound, a drop of fluid which turns to visible smoke-like gas on contact with the air. By the time the pursuer has recovered from astonishment and the inconvenience of this gas, the bombardier has frequently made good its escape, but, if needful, the discharge can be quickly repeated several times. The liquid or gas changes blue vegetable colors to red and then to yellow, produces sharp pain when applied to the tongue, and leaves a yellow spot upon its surface, like that produced by a drop of nitric acid. There are more than 25 described species in the United States, but as yet no definite characters have been discovered for their separation. See **GROUND BEETLE**.

BOMBARDMENT (Fr. *bombarde*, a cannon, a musical instrument, It. *bombarda*, a musical instrument, a cannon, from Lat. *bombus*, booming noise, cf. *bomb*). An attack upon the fortifications of an opponent by artillery, cannon, and other heavy ordnance. All modern battles begin, when possible, by a heavy bombardment of the enemy's position (See **ATTACK**). The bombardment of a fortified town is a much more difficult undertaking, owing to the practical impossibility of knowing what results are being accomplished, or with what degree of accuracy the aim is taken. With reasonably strong defenses and time for preparation, together with means speedily available for the suppression of conflagration, the modern bombardment is more formidable for its moral effect and usefulness in blockading than for the actual damage it does the enemy, great as that might possibly be. It is an established fact that few modern bombardments have been particularly destructive. At the siege of Paris by the Germans, in the War of 1870-71, an average of 500 shells daily actually fell within the city, but accomplished comparatively little damage. In the British-Boer War of 1899-1902 the bombardment of Ladysmith and Kimberley was of daily occurrence, the deadliest of modern ordnance and explosives being brought into use, but there also little damage was inflicted.

Buildings under the flag of the Red Cross are required to be some distance away from the combatants and are supposed to be exempt from bombardment. According to international agreement, 24 hours' or more notice of bombardment is given for the protection of non-combatants and their property.

The attack of defensive positions by naval vessels is not generally regarded as likely to result in serious injury, but much depends on the character of attack. Moreover, permanent injury may not be sought. In many instances it has been found possible to smother the fire of a fort by rapid fire from the small and medium calibre guns of ships. Where the guns are mounted behind low parapets or breastworks, and the embrasures are large, this may easily be done, if the preponderance of fire of the ships is considerable. At the attack on the defenses of San Juan, Porto Rico, in May, 1898, by the fleet under Admiral Sampson, the Morro batteries, armed with very recently constructed six-inch guns, were silenced, though not much injured. Protected in this way by the fire of

the fleet, the torpedo boat *Porter* was able to go close under the guns of the fort and examine the harbor, in order to ascertain what Spanish ships were in the port. Modern coast-defense armament, however, when well served, is practically impregnable to naval attack, ships not daring to come within the range of the high-power guns which have the great advantage of fixed bases.

In the various bombardments of the batteries at Santiago the men were driven from the works, but the damage done was of little account. The bombardment of the town by the vessels of the fleet was very successful and was the leading immediate cause of the surrender. The guns used were of eight-inch calibre, the shells weighing 250 pounds. The naval vessels fired over an intervening rise of ground with a range of 4 miles, the fall of the projectiles being reported by the Army Signal Corps. For fear of striking in the American lines the first shells were directed too far to the left and fell into the water. The next lot—about 25 of them—all fell on the water-front street, in a space about 200 yards long and 30 yards wide. The third lot fell in a space of about the same area, about half-way from the water front to the palace, wrecking the interior of every house they struck and in some cases destroying the exterior walls. The direction of firing was again changed, and three shells fell just beyond the palace, passing close to its roof, when the signal to cease firing was seen.

The problem of attacking a fortress armed with modern weapons was tested for the first time, on a large scale, by the Japanese at Port Arthur in 1904-05. They first tried without success the methods so long advocated by a prominent school of European artillerymen, who maintained that after a long bombardment the defenders would be so demoralized and exhausted, physically, mentally, and morally, that the place could be carried by assault. The Japanese used over 400 guns, mortars of 28 cm. (18 of them), 21 cm., and 15 cm., and siege guns of 15, 12, and 11 cm., besides 128 field pieces, all modern weapons firing explosive shell and most skillfully handled. Their bombardments were magnificently conceived and executed. During the 327 days of the siege the bombardments lasted 149 days, with only short interruptions, and the Russian forts were repeatedly silenced completely. Yet the total damage to material, ships as well as forts, was not considerable. The coast fortifications fulfilled their purpose well and kept the victorious Japanese fleet at a safe distance, while the Russian fleet could enter and leave the harbor at will. These works, on account of their altitude, had nothing to fear from the Japanese fleet. The effect of the sustained and irresistible fire of the large Japanese mortars on the *personnel* contributed largely to the downfall of the city.

All other recent bombardments have taught the same lessons as may be learned from these, which are, that the damage done to fortifications is trifling compared to the expenditure of ammunition, but that, when the bombardment is directed against trenches or troops in the open, the actual and moral effects are considerable. It must not be assumed that because ships cannot successfully attack forts the latter can stop a fleet of modern armored ships from running by them. Of course some of the ships may be badly damaged, but if the channel is clear and

not too close to the enemy's guns, the greater part of the vessels will probably get by without serious injury. This contingency is guarded against in harbor fortifications by the planting of mine fields in the waters over which ships must pass. Submarine mines have been so perfected that they may be controlled from mine casemates on shore and are absolutely harmless to friendly ships.

Bibliography. In the *Report of the British Naval and Military Operations in Egypt in 1882* (Office of Naval Intelligence, Washington, 1885), will be found a detailed account of the bombardment of Alexandria. Compare, also, attacks on Charleston by the Federal fleet during the Civil War, and the bombardment of Forts Jackson and St. Philip, below New Orleans, and of Fort Fisher, near Wilmington.

See COAST DEFENSE, SIEGE AND SIEGE WORKS, and FORTIFICATION, for military tactics to be followed and means employed for defense against bombardment.

BOMBARDON. See SAXHORN.

BOMBASTES FURIO'SO. The title of an opera (1790) by William Barnes Rhodes, a parody of *Orlando Furioso*.

BOMBAX. See ERIODENDRON.

BOMBAY, bōm-bā'. A presidency of British India, extending along the western coast of the peninsula from about lat. 14° to about 18° 30' N. (Map: India, B 5). It is bounded by Baluchistan on the north, Rajputana, Central India, the Central Provinces, Berrar, and Hyderabad on the east, Mysore and Madras on the south, and the Arabian Sea and Baluchistan on the west. The western part of the province is partly traversed by the range of the Western Ghats, running either close to the coast or retreating about 50 miles inland. They have numerous offshoots into the interior, and their slopes are covered with thick forests. Physically the province is divided into four parts: Sindh, the northern division, with a low surface, mostly unproductive; Gujarat, having a rich, alluvial soil, well watered; Konkan, a mountainous region, very little cultivated; and the Deccan, in the south, suffering from insufficient rainfall. The chief rivers are the Indus, which drains only the Sindh, the Tapti, and the Nerbudda. The climate, with a few exceptions, is hot and oppressive. A temperature of 130° is not rare, while in some places for about six months in the year the temperature averages about 95° in the shade. In the lower portions the rainy season is sometimes followed by epidemics of fever.

Throughout the greater part of the presidency very little cultivable land remains uncultivated, and about three-quarters of the population are engaged in or dependent on agriculture. The principal food crops are rice, bajra (spiked millet), jowar (great millet), and wheat. Rice is raised, especially in the Konkan, and wheat in Sind, northern Gujarat, and the Deccan; bajra and jowar grow almost everywhere except in the Konkan. Of non-food crops, cotton is the most important and is raised especially in Gujarat, the Tapti valley, and the south-eastern Deccan. As reported for 1909-10, the total area of the presidency was 85,610,300 acres, including native states with 36,989,440 acres, British territory aggregating 48,620,860 acres. Of the latter area, 25,353,065 acres were cropped (net area, i.e., exclusive of second crops), 7,501,470 were fallow, 1,879,259 cultivable waste other than fallow, 5,857,398 not

available for cultivation, and 788,353 forest. Of the net area cropped in 1909-10, there were under food grains and pulses 20,091,642 acres (rice, 1,864,054, wheat, 1,382,949, jowar, 6,401,742, bajra, 5,505,074, gram, 562,743), oil seeds, 1,444,037, fibres, 4,035,108 (cotton, 3,872,117), condiments and spices, 221,757, sugar cane, 58,947. The area under cotton amounted to over 29 per cent of the total cotton area of British India. With the exception of salt and building stone, the mineral production of the presidency is insignificant.

The manufacturing industries are chiefly confined to the production of cotton and silk fabrics, leather, and brass ware. The first cotton mill was started in Bombay City in 1857, in 1909-10 there were (in British territory) 216, producing 593,267,000 pounds of yarn and 215,361,000 pounds of woven goods. But many years of competition between machine-made and hand-woven cotton cloth have still left a very considerable home industry, the hand loom is employed in almost every district. The domestic demand for raw cotton is largely supplied by the presidency, which also sends some to other parts of India and exports immense quantities to Great Britain.

In its foreign trade Bombay is exceeded by no other province of India. Its imports of private merchandise in 1909-10 amounted to £33,008,660 and its exports £51,654,353 (£26,349,752 and £37,033,054 being credited to Bombay City and most of the remainder to Karachi). The imports represented over 42 per cent and the exports over 41 per cent of the total for British India. The chief imports are cotton piece goods, metals and machinery, sugar, oils, and silk and woolen manufactures, supplied largely by the United Kingdom. The leading exports are raw cotton, grain, and pulse, oil seeds, and hides.

At the end of 1904 there were 4137 miles of railway in the presidency, or one mile of railway to every 46 square miles of territory. The lines are government-owned, but mostly operated by private companies. The main lines concentrate at Bombay City, with one exception, whose terminus is the port of Karachi.

The government of the presidency (whose capital is Bombay City) is administered by a governor in council, consisting of the governor as president and two members of the Indian Civil Service, all of whom are appointed by the crown. The legislative power rests with a legislative council, consisting of 48 members (18 official, 28 unofficial, and 2 experts). Under the governor in council the presidency is administered by four commissioners—the commissioner in Sind, who has special powers, and the commissioners in the Northern, Central, and Southern divisions. Justice is administered by the high court at Bombay City and by numerous district courts. The control of the Bombay government over the native states is exercised through political agents placed at the principal native courts. (The important native state of Baroda, though geographically within the Bombay Presidency, is not included among the Bombay native states, as it is under the political control of the government of India.)

In British territory at the census of March 10, 1911, out of a total population of 19,672,642, the literates numbered only 1,372,826 (of whom 136,620 were female), and literates in English, 202,464 (26,769 female). In the native states, out of a total of 7,411,675, the literates num-

bered 487,667 (41,838, female), and the literates in English 28,472 (764 female). In 1909-10 there were in British territory 12,472 public educational institutions, with 770,435 scholars (of whom 116,731 were female), and 3008 private institutions, with 79,858 scholars (18,629 female), total, 15,480 institutions, with 850,293 scholars (133,360 female). The public institutions included 11 arts colleges (3034 students), 4 professional colleges (1162) 548 secondary schools (70,354), 11,790 primary schools (690,533), 21 training schools (1546), 50 other special schools (3806). Advanced private schools numbered 110 (4347 students), elementary, 2898 (75,511).

Below is shown the population according to the censuses of 1901 and 1911, with the percentage of variation between 1891 and 1901 and 1901 and 1911 (the figures for Aden shown separately).

	Pop 1901	Var	Pop 1911	Var
British territory	18,515,676	- 17	19,826,477	6.0
Aden	43,974	- 0.2	46,185	5.0
Bombay states	6,908,559	-14.5	7,411,675	7.3
Total	25,468,209	-5.5	27,084,317	6.3

In 1911 males numbered 14,011,248, and females 13,073,069. The principal religious elements in 1911 in British territory (including Aden) and in the native states were as follows: Hindu, 14,922,311 and 6,054,992, Mohammedan, 4,024,485 and 877,431, Jain, 212,309 and 277,643, Christian, 233,246 and 12,411, Animistic, 170,355 and 149,879, Parsee, 80,980 and 2535. The population of the larger cities in 1911 was: Bombay City, 979,445, Ahmedabad, 215,835, Poona, 158,856, Karachi, 151,903, Surat, 114,868, Sholapur, 61,345. The percentage of the people, in both British and native territory, speaking one of the four main languages (including kindred dialects), was as follows in 1901: Marathi, 40.66, Gujarati, 28.09, Kanarese, 12.18, Sindhi, 11.54. The only other languages of any importance are Western Hindi (which includes Hindustani), Rajasthan, Telugu, Bhill, and Baluchi, of which all but Hindi and Bhill are the languages of immigrants.

Consult Drew, *Bombay and its Feudatories* (Bombay, 1892), Edwards, *The Rise of Bombay* (1902), Douglas, *Bombay and Western India* (1893), Lee-Warner, *The Presidency of Bombay* (1904).

BOMBAY CITY (Hind *Bambai*, Malay *Bambé*, after the goddess *Bambé Mumba*, through popular etymology turned by the Portuguese into *Bom bahia*, *bon*, *Lat bonus*, good, fair + *bahia*, haven, port). A city and the principal seaport of western India, capital of the Presidency of Bombay, situated on an island in 18° 55' N lat and 72° 54' E long (Map India, B 5). Bombay Island, one of a group lying off the coast of the Konkan, is now, by causeways and breakwaters, permanently united on the north end with the larger island of Salsette and so continuously with the mainland. The city limits coincide with the island (22 square miles), but most of the built-up portion occupies only the southern part, it has two water fronts, one on the outer Back Bay and the other on the splendid inner land-locked harbor, which has an area available for shipping 14 miles long by 5 miles broad. It is defended by batteries equipped with modern armament, and by a small

navy comprising torpedo boats, destroyers, and monitors. Bombay vies with Calcutta as the commercial centre of India, surpassing the former as a centre of distribution and having double the coasting trade, though a smaller foreign trade. In 1910 Bombay's imports and exports were valued at £26,349,752 and £37,033,054, against £31,081,033 and £46,591,334 for Calcutta. It is the terminus and departing point of various European steamship and mail lines, of the Great Indian Peninsula Railway, and of the Bombay, Baroda, and Central India Railway. It possesses one of the finest railway depots in the world, extensive docks, basins, graving docks, and shipbuilding slips; the government dockyard covers about 200 acres. The construction of the Alexandra Dock, 50 acres in extent, with a dry dock 1000 feet long and a mole where mail steamers can lie alongside, was to be completed in 1913, the total cost (including that of the reclamation of 600 acres and the erection of a new railway station) being over £5,000,000. The principal portion of the city, with long, wide streets, traversed by street railways and lined by fine commercial establishments, presents a thoroughly European aspect. Many of the public and commercial buildings are of splendid dimensions and have no rival in any other Indian city except, perhaps, Calcutta. The objects most worthy of note are the Secretariat (in Venetian Gothic), the University Library, Senate Hall, and Rajabai clock tower, the cathedral, the Colaba church, the customhouse, post office, public-works office, missionary houses, the Elphinstone Institution, the Grant Medical College, Sassoon's High School, the Jamsetjee Hospital, and the Jamsetjee Obstetric Hospital. The city possesses a chamber of commerce, two English theatres and a native theatre, and numerous educational, benevolent, and charitable institutions. Since 1892 the city has owned a modern system of water works, supplied from Lake Tansa, 65 miles north. It is lighted by gas and electricity, and owns and maintains abattoirs, markets, public swimming and other baths, gardens, with weekly band concerts, and the esplanade, a favorite promenade. The streets of the native quarter are narrow and winding, but marked by cleanliness; and the well-stocked bazars, the temples, and the curiously painted houses, thronged by polyglot Oriental crowds, present a most picturesque appearance. Besides several native newspapers, there are three published in English.

Always favorably situated for foreign trade, Bombay profited largely by the opening of the Suez Canal. When the Civil War in the United States caused a sudden cessation of American supplies, cotton began to be exported from Bombay in vast quantities, and although the reopening of the Southern ports soon checked this extraordinary activity, Bombay was permanently benefited by the stimulus its commerce received. The chief exports are raw cotton, grain, seeds, and cotton twist and yarn. The local industries include the manufacture of yarn, cotton cloth, copper and brass utensils, wood carving, lacquer work, pottery, and gold and silver thread; and the dyeing and tanning trades are prosperous. But the characteristic feature of Bombay manufacture is the rapid growth of the European factory system. The chief imports are piece goods, thread, yarn, metals, sugar, wine, beer, tea, and silk. Bombay is the seat of various

foreign representatives, including a United States consul. The climate, though less severe than that of the interior, is oppressive, owing to the extreme moisture of the air for most of the year. The average temperature is 79.2° F.; the average rainfall for the 20 years ended 1901 was 74.27 inches. The population, which is exceedingly heterogeneous and dense, amounted in 1891 to 821,764; in 1901, 776,006, showing a decline of 5.6 per cent (it should be noted that when the 1901 census was taken plague was raging in Bombay, and many persons had left the city); in 1911, 979,445, the increase being 26.2 per cent. These figures relate to Bombay Island (22 square miles), the area administered by the Bombay municipality. Some of the early estimates of population were: in 1661, when Bombay was ceded to the English, about 10,000; in 1744, 70,000; in 1780, 113,726; in 1814, 180,000; in 1838, 236,000; in 1846, 566,110; in 1864, 816,562 (due in part to the prosperity Bombay enjoyed during the American Civil War); in 1872, 844,405. Before the outbreak of the plague in 1896, the death rate was 24 per thousand, it subsequently rose to 78. The birth rate is only about 14, the majority of the population being immigrants whose women return to their homes at the time of maternity. The Hindus predominate in numbers, the Parsis number over 46,000, and the rest are Mussulmans (156,747 in 1901), native Christians, Europeans, Indo-Portuguese, Jews, Jains, etc. Amid these various classes the Parsis, descendants of fire worshippers, driven from Persia by Mohammedan bigotry, rank next to the English in respectability and influence.

The Portuguese visited Bombay in 1509, about a year before the capture of Goa, and in 1534 it passed into their possession. In 1661 the island was ceded to Charles II of England, as part of the dowry of his bride, the Infanta Catharine. He granted it to the East India Company in 1668. The real founder of the modern city was Gerald Aungier (in 1669-77), who determined the land revenue, established courts of law, strengthened the defenses, and secured freedom of trade and worship. Consult: Windham, "The Town and Isles of Bombay, Past and Present," in vol. xlix of *Society of Arts Journal* (London, 1901), Eastwick, *Handbook to Bombay* (London, 1881); Hunter, *Bombay, 1885-90* (London, 1890); Edwardes, *The Gazetteer of Bombay City and Island*, 3 vols. (Bombay, 1900-10). See ELEPHANTA and accompanying Plate.

BOMBAY DUCK. See BUMMALOTI.

BOMBAY ISLAND. See BOMBAY CITY.

BOMBRAZINE, bōm'bā-zēn' or bōm'- (Lat. *bombycinum*, silk texture, from Gk. *bōmbrāzē*, *bombyx*, silkworm; through Fr. *bombasin*). A twilled cloth for dresses, in which the distinguishing characteristic is that the warp is silk and the filling worsted. The cloth has thus a shiny look. It is rather fine and light in weight and may be of any color. It was extensively made, chiefly in Norwich, England, from about 1816.

BOMBELLI, bōm-bel'le, RAFAELE. An Italian mathematician, born about 1530. He went a step farther than Cardano in dealing with imaginary quantities and simplified the solution of the cubic equation in the so-called irreducible case. His *Algebra* (1572) gave a remarkably clear exposition of the science as it then existed and was a widely read book for many years.

BOMBPROOF. A military structure capable of resisting artillery shot and shell, particularly that alighting overhead. In permanent fortifications and defenses they are either cut out of solid rock, as at Gibraltar, or constructed of massive masonry, as at Malta, or at Helsingfors, Finland, a position which is considered impregnable. Temporary bombproofs are constructed out of timber and earth or any other available and suitable material. Galleries are frequently run underground or in hillside for the protection of the sick, women and children, and noncombatants generally. See BLINDAGE, FORTIFICATION.

BOMBÓN See TAAL.

BOMB VESSEL See MORTAR VESSEL.

BOMBYCIDÆ, bóm-bis't-dé (Gk *bómbyx*, Lat *bombyx*, silkworm). A family of Lepidoptera with stout, hairy bodies, including the silkworm moths and their allies. They have no frenulum, the first maxilla is vestigial, and the palpi of the second maxilla are greatly reduced. "The feelers are bipennate in both sexes. The fore wings are usually pointed at the tip, and the lower radial nervures bend downward, the hind wings have two or three anal nervures. The caterpillars, with 10 fore legs, are elongate, not hairy, but furnished with dorsal humps on some of the segments, often with a spine on the hindmost. The pupa is inclosed in a cocoon of fine silk." (Carpenter.) The Bombycidae are fairly numerous in southeastern Asia, but less common elsewhere. Several North American forms are known, such as the great Cecropia, polyphemus, and luna moths, and the smaller puss moths, tussock moths, and tent caterpillars. These moths have long been noted for the strong attractive power which the virgin females exert on the males, drawing them from long distances and sometimes in large numbers, collectors utilize this trait to capture specimens, by exposing the females in cages about which males will soon assemble. Consult Packard, "Monograph of the Bombycine Moths of America," *Memoirs National Academy of Sciences*, vol vii (Washington, 1896), Beutenmuller, "Descriptive Catalogue of the Bombycine Moths within Fifty Miles of New York City," *Bulletin American Museum of Natural History*, vol x (New York, 1898), Neumegen and Dyar, "Revision of the Bombycines of North America," *Journal New York Entomological Society*, 1893 and 1894. See MOTH, SILKWORM, ETC.

BOMFIM, bóm-fén', José Lúcio Valdez, COUNT (1787-1863). A Portuguese soldier, born at Peniche (Estremadura). In 1828 he fought with the rank of colonel against Dom Miguel, and in 1832, when Dom Pedro landed in Portugal, continued under him the struggle against the usurper. He entered the cabinet as Minister of War and Marine in 1841, in 1842 took the field against the Absolutists, who had set aside the Constitution of 1837, and in 1844 was compelled to surrender and made his escape to Spain. He was prominent in the insurrection of 1846 and, having been routed at Torres Vedras, was sentenced to banishment to Africa. He returned under the amnesty of 1847.

BOMFORD, bóm-fórd, GEORGE (1780-1848). An American soldier, born in New York City. He graduated at West Point in 1805, served as an engineer in the construction of fortifications until 1812, and, as an ordnance officer during the War of 1812, rendered valuable services to the

government. Among other things he invented and introduced the bomb-cannon, called the "Columbiad," which was superseded by the Rodman gun at the beginning of the Civil War. He became colonel in 1832 and was chief of ordnance from 1832 until 1842, when he became inspector of arsenals, ordnance, arms, and munitions of war.

BOM JARDIM, bóm zhar-dén' (Portug. Good Garden). A city in the state of Ceará, Brazil, 200 miles south of Ceará City, in a rich and beautiful mountain valley. It is the centre of an extensive district, yielding manioc, sugar, etc. Pop., 6000.

BOM JARDIM. A city and municipality of Brazil in the state of Pernambuco. An active trade in cattle is carried on, and the surrounding country is taken up with the cultivation of sugar cane, manioc, tobacco, cotton, coffee, corn, rice, and beans. Pop., 28,000.

BOMMELWAARD, bóm-mel-vart. An island in the province of Gelderland, Holland, formed by the Waal and Meuse. It is 16 miles in length, with a maximum breadth of 6 miles. The district is extremely fertile and raises, besides other farm produce, considerable flax and hops. The town of Bommel is situated on the island. Fort St Andries defends the island on the east and Fort Loevestein on the west.

BON See BOZO.

BO'NA (pl of Lat *bonum*, something good).

A general legal term denoting property of any kind, whether real or personal. In the Roman law it was chiefly applied to real estate, in the later civil law it corresponds to the French term *biens*, comprising real as well as personal property, but in the common law it is confined generally to the latter. It is employed in phrases of varying significance in the English law and, derivatively, though less commonly, in American legal phraseology, as, *bona confiscata*, goods confiscated or forfeited to the crown, *bona notabilia*, property of sufficient value to be noted in an account (formerly in England this was fixed at £5 or upward, and in London at £10, but by the acts creating courts of probate this distinction has been abolished), *bona paraphernalia*, the personal possessions, such as clothing and jewels, which a wife may claim as her own after her husband's death, *bona vacantia*, unclaimed property, as wrecks, treasure trove, waifs, and estrays, which, contrary to the general rule, did not go to the finder, but vested in the crown, *bona vacuata*, property thrown away, as by a thief in flight, by common law going to the king, *nulla bona*, the return of an execution without property found. See CHATTEL.

BONA (Fr *Bône*, Ar *Beled-el-Areb*). A fortified seaport town in the department of Constantine, Algeria, situated on a bay of the Mediterranean, in lat 36° 54' N, long 7° 46' E (Map Africa, E 1). The town, divided into two parts, Upper and Lower Bona, is situated in a beautiful district, at the foot of a hill near the embouchure of the Seybouse. It has been much improved since the occupation by the French in 1832 and beautified by means of the quays and promenades encircling it, and the numerous fountains and gardens to be found all over the city. It is surrounded by walls flanked with square towers and further defended by Fort Cigogne, on the top of the hill. The fortress built by Charles V in 1535 stands on a hill over 340 feet high, and has been used as a prison since 1850 for persons sentenced to deportation.

from France. Among the other public buildings, the cathedral of St. Augustine and the convent of the Sisters of Mercy are notable. Bona has good bazars, shops, markets, reading rooms, etc.; manufactures of tapestry, saddlery, and native clothing; and a trade in cattle, sheep, wool, hides, corn, coral, fish, olive oil, tobacco, and wax. In the vicinity are valuable iron mines, marble quarries, phosphate beds, and cork woods. There are telegraphic communication with Marseilles and regular steam connection with France, Algiers, and Tunis. A fine harbor of 195 acres with an inner basin of 25 acres dates from 1870. It is visited annually by nearly 3000 ships of more than a million net tonnage. Since the construction of the railroad connecting the city with Algiers, Constantine, and Biskra, Bona has left Tunis behind as a port. The neighboring hills yield a fine water supply, and the former marshy and unhealthy condition of the surrounding districts has been improved by drainage. The United States is represented by an agent. Pop. (communal), 1911, 42,039. Near Bona are remains of the once famous city Hippo Regius, the favorite residence of the Numidian kings and the episcopal see of St. Augustine, who died there in 430. Hippo Regius, in early Christian times, was the central station of commerce and civilization in northern Africa and was celebrated for its schools, theatre, aqueducts, palaces, and temples, afterward changed into churches and monasteries. It was destroyed by the Mohammedans under Caliph Othman in 646. This city was connected with its seaport, the ancient *Aphroditum* (the present Bona), by a canal, of which the outline may still be seen in a morass.

BONA, GIOVANNI (1609-74). An Italian Cardinal, author of *De Principiis Vita Christianae* and *Manducatio ad calum*. The latter was translated into English (London, 1672; 6th ed., 1712); and parts of his *Vita Compendii ad Deum*, 'The Easy Way to God' (1876). A recent translation of the *Manducatio* is by L'Estrange, 'A Guide to Eternity' (London, 1900). His complete works appeared in Latin (2 vols., Antwerp, 1677). His work on the Mass appeared in French (2 vols., Paris, 1854-55). He also contributed to the *Acta Sanctorum*. For his biography, consult A. Ighina (Mondovì, Italy, 1874).

BONACI, bō'nā-sā' (Sp. *bonasí*, from the native name). A grouper of the genus *Mycteroperca*, specifically *Mycteroperca bonaci*. See GROUPERS.

BONA DE'A (Lat. 'the good goddess'). A mysterious Roman divinity, variously identified with Fauna, Ops, or Maia. She was worshipped in Rome from the most ancient times, but only by women, even her name being concealed from men. Her sanctuary was a grotto on Mons Aventinus, which had been consecrated to her, tradition said, by the virgin Claudia; here a festival in her honor was held on the 1st of May. Another annual festival in her honor, held in December, was not celebrated there, but in the house of a magistrate with *imperium*, a consul or a praetor, inasmuch as the sacrifices were then offered up for the whole Roman nation. The solemnities were performed generally by aristocratic vestals. At this celebration no males were allowed to be present; even portraits of men were veiled. The wine consumed was called milk, in order that its name might not be discovered, and the vessel in which it

was served, *mellarium*, honey vessel. The symbol of the goddess was a serpent, indicating her healing powers (see AESCULAPIUS); herbs with healing properties were sold in her temple. In his *Roman Festivals* (London, 1899), 101-106, Fowler holds that Bona Dea was "at one time . . . a protective deity of the female sex, the Earth-Mother, a kindly and helpful, but shy and unknowable deity of fertility." The victim sacrificed to her, as to other deities of fertility, was a *porca*, sow. The December festival Fowler (p. 256) regards as a survival from a time "when the wife of the chief of the community—himself its priest—together with her daughters (represented in later times by the Vestals), and the other matrons, made sacrifice of a young pig or pigs to the deity of fertility, from all share in which men were rigorously excluded." In 62 B.C. the notorious Clodius (q.v.) committed the sacrilege of appearing disguised as a woman at the mysteries of Bona Dea, an act which had an important bearing on the career of Cicero (q.v.).

BONA FIDE, fr'dé (Lat. abl. of *bona fides*, good faith). Literally, 'in good faith.' A term which embodied an important principle of the Roman law, one that exerted a powerful influence in the development of what we should call the "equity" of that legal system. Actions *bona fidei*, where the court entered into the motives of acts and administered justice on broad principles of natural equity, were distinguished from actions *stricti iuris*, in which the expressed intentions of the parties were given effect. The effect of *bona fides* in the determination of legal rights may be illustrated by the rule that one who claimed title to lands or goods by prescription was required to show that his possession was in good faith, i.e., was believed by him to be legal; as also by the doctrine which permitted one who had taken possession of another's land in good faith, i.e., believing himself to be the owner, to retain the profits of the land during the period of his possession, whereas the trespasser in bad faith was required to surrender with the land the profits he had gained therefrom.

The principle of *bona fides* has played a less important part in our legal system, it being a generally accepted doctrine of English and American civil law that the courts have nothing to do with the motive with which an act is performed. In the criminal law, of course, the case is different, the motive or "intent" being the determining factor in crime. But even in the civil relations of men, there are important exceptions to the doctrine above set forth, especially in equity. Thus if a person takes possession of another's property, honestly believing it to be his own, and, without notice of the other's title, adds to its value, his liability to the owner is for the value of the property when originally taken; but if the taking is in bad faith, he is held liable, generally, for the whole value of the improved property, without any allowance for his enhancement of its worth. A bona-fide purchaser is one who buys property for a valuable consideration, without notice of any defect in his vendor's title and believing that the vendor has a good right to sell and convey a good title. By the civil-law rule, which prevails on the continent of Europe and in Scotland, such a purchaser from a trader in the course of his business acquires a perfect title, though his vendor had none. According

to the English common law, however, his title is no better than his vendor's. If the vendor had title, but one which was voidable by a third person for fraud (qv), the bona-fide purchaser would be able to hold the property. So a bona-fide purchaser of property from a trustee clothed with the legal title can hold it as against the *cestui que trust* or beneficiary (qv). Again, the bona-fide purchaser of a negotiable instrument (qv) holds it free from any defect of title between prior parties, and free from defenses available to prior parties among themselves. This rule had its origin in the customs of merchants and received the sanction of common-law courts because it was necessary to enable negotiable paper to discharge the functions of currency. See CRIME, TORT, EQUITY, TRUST.

BONAINI, bô-nî-nê, FRANCESCO (1806-74). An Italian historian, born in Leghorn. He studied in Pisa and was appointed professor of ecclesiastical law there in 1827 and professor of the history of law in 1840. In 1852 he was appointed general superintendent of the state archives of Tuscany. He was successful as an archivist and was also exceedingly active as an author and editor. His works include a collection of the legends of Pisa, in the *Archivio Storico Italiano* (1844-45), a more important collection of documents, the *Statuti inediti della città di Pisa dal XII al XIV secolo* (1851), *Cronache e storie di Perugia* (2 vols., 1850-51), and the posthumous *Acta Henrici VII* (1877).

BONAIRE. See BUEN AYRE.

BONALD, bô-nâl', LOUIS GABRIEL AMBROISE, VICOMTE DE (1754-1840). A French publicist and theocratic writer, born at Mouna, in Aveyron. An ardent adherent of the old monarchy, he was compelled to emigrate during the French Revolution and went to Heidelberg, where he wrote politico-philosophic works in support of monarchy. His first important work, *Théorie du pouvoir politique et religieux* (3 vols., 1796), was seized by the Directory. It prophesied the restoration of the Bourbons. He returned to France about 1806, won the favor of Napoleon, and in 1808 was appointed Minister of Instruction. In 1815 he was elected to the Chamber of Deputies, and there, as well as afterward in the Chamber of Peers, was conspicuous by his opposition to all liberal projects, notably the freedom of the press. The July Revolution brought his public career to a close, and he refused to take the oath of allegiance to the new dynasty. His most important writings are *Législation primitive* (3 vols., 1802) and *Recherches philosophiques sur les premiers objets des connaissances morales* (2 vols., 1818).

BONAN'ZA (Sp. fair wind or weather, prosperity, from Lat. *bonus*, good). A term applied to the mining districts of the United States to the discovery of an exceedingly rich vein or body of ore. When such a vein has been struck, the mine is said to be a "bonanza." In the celebrated Comstock Lode in Nevada some 10 bonanzas were found, the most famous of which, known as the "Big Bonanza," was discovered in 1876. The word "bonanza" has a popular application also to a successful enterprise or to any piece of good luck.

BONAPARTE, bô-na-part, CHARLES JOSEPH (1851-) An American public official, the grandson of Jerome Bonaparte, born in Baltimore. He graduated from Harvard in 1871 and from the Harvard Law School in 1874, practiced

law in Baltimore and became prominent in movements for the betterment of municipal and national affairs. From 1902 to 1904 he was a member of the Board of Indian Commissioners, he was a Republican presidential elector from Maryland in 1904, chairman of the National Civil Service Reform League in 1904, and president of the National Municipal League in 1905. For 10 years from 1891 he was an overseer of Harvard University, and he was made a trustee of the Catholic University of America in 1904. In 1905 he became Secretary of the Navy, and was Attorney-General from 1906 to 1909. He wrote *Can We Trust Our Army to Spoilsmen?* (1898), *The Essential Element in Good City Government* (1901), *Some Duties and Responsibilities of American Catholics* (1905), *Civil Service as a Moral Reform Question* (1908).

BONAPARTE, bô-na-part, It. **BUONAPARTE**, bwô-na-par'tà, FAMILY OF. The Bonaparte family originated in Italy and may be traced in the records of Florence, San Miniato, and elsewhere. The Corsican branch, the only one of historical importance, went to Corsica from Sarzana, in Genoese territory, about 1610, and its representatives took up their residence at Ajaccio, where they occupied a respectable position as patricians, *padri del commune* or *cittadini*, without especial prominence until the rise of the great Napoleon. The Grand Duke of Tuscany in 1757 issued a formal patent of nobility to Joseph, the grandfather of Napoleon, and a coat of arms. The title of patrician was also granted by the Grand Duke two years later. In the eighteenth century the following representatives of the family resided at Ajaccio, the archdeacon, Lucien Bonaparte, his brother, Napoleon Bonaparte, and their nephew, Carlo—CARLO BONAPARTE, father of the Emperor Napoleon, was born March 29, 1746, studied law in Pisa, and married, in 1767, a beautiful young patrician, named Letizia Ramolino. In 1768, with his uncle Napoleon, he joined General Paoli in defending the island against the French invaders. When resistance was shown to be useless, Carlo Bonaparte attached himself to the French interest, and in 1771 was included by Louis XV in the list of 400 Corsican families chosen to form a nobility. In 1773, through the influence of Marbeuf, Governor of Corsica, Carlo Bonaparte was appointed royal counselor and assessor of the town and province of Ajaccio. In 1777 he was a member of the deputation of Corsican nobles to the court of France. In this capacity he resided for some time in Paris, where he gained for his son, Napoleon, through the interest of Count Marbeuf, admission into the military school at Brienne. In 1779 he returned to Corsica and in 1785 went to Montpellier, for the benefit of his health, but died there, Feb. 24, 1785. MARIA LETIZIA RAMOLINO, his wife and mother of Napoleon I, lived to see the rise and decline of power of her family and met them with equanimity and dignity. She was born at Ajaccio, Aug. 24, 1750. After the death of her husband she lived for some time in Corsica, and in 1793, when the island came under British rule, removed with her family to Marseilles, where she lived in poverty, mainly supported by the pension given to Corsican refugees. After her son became First Consul she moved to Paris, and when he was crowned Emperor, in 1804, received the title of Madame Mère. She never cared for the brilliant surroundings of the Imperial court. After the downfall of Napoleon

Letizia lived with her stepbrother, Cardinal Fesch—in winter in Rome, and in summer in Albano. She died, Feb. 2, 1836, leaving considerable property, the result of saving habits during prosperity.

Eight children were born to Carlo Bonaparte and Letizia his wife: Joseph, King of Spain; Napoleon, Emperor of the French; Lucien, Prince of Canino; Marianne (afterward named Elisa), Princess of Lucca and Piombino, Grand Duchess of Tuscany, Countess of Campignano, wife of Prince Baciocchi; Louis, King of Holland; Carlotta (afterward named Marie Pauline), Princess Borghese; Annunziata (afterward named Caroline), wife of Murat, King of Naples; Jerome, King of Westphalia. By a decree of the French Senate, Nov. 8, 1804, the right of succession to the Imperial throne was restricted to Napoleon and his brothers Joseph and Louis, with their offspring. Lucien and Jerome were excluded on account of their unsuitable marriages. Napoleon intended to give the right of succession also to Lucien, by the additional Act of April 22, 1815; but this never took effect. As Joseph, the eldest brother of the Emperor, had no son, the descendants of Louis became nearest heirs to the throne.

JOSEPH, the eldest brother of Napoleon, was born at Corte, in Corsica, Jan. 7, 1768, and was educated at Autun. On the death of his father he returned to Corsica, exerted himself to support the younger members of the family, and removed with them to Marseilles in 1793. In 1797 he was elected a member of the Council of Five Hundred and in the same year was sent as Ambassador from the Republic to Rome. In 1800 he was chosen by the First Consul as plenipotentiary to conclude a treaty of friendship with the United States of North America. He signed the Treaty of Lunville, Feb. 9, 1801, and that of Amiens, 1802, and with Cretet and Bernier conducted the negotiations relative to the Concordat. After the coronation of Napoleon Joseph was made commander in chief of the army of Naples, and in 1806 King of Naples. He effected many beneficial changes—such as the abolition of feudalism, the suppression of convents, the building of roads, the repression of banditti, and the codification of laws—but these reforms were not managed judiciously and frequently came into collision with the ambitions of his Imperial brother. He was a lover of the fine arts and a man of progressive ideas, but not a vigorous ruler for stormy times. In 1808 Joseph was summarily transferred by his brother to the throne of Spain, and Murat took his place as King of Naples. Joseph was not able to cope with the Spanish insurgents, backed by the power of England, and after the defeat of the French at Vittoria, in 1813, he returned to his estate at Morfontaine, in France. When Napoleon recognized Ferdinand VII as King of Spain Joseph refused at first to abdicate, though he had many times before implored his brother to release him from his royal chains; but he soon submitted, as in all other matters, to the Emperor's will. After the battle of Waterloo he accompanied Napoleon to Rochefort, whence they intended to sail separately for North America. In his last interview with Napoleon Joseph generously offered to give up the vessel hired for his own escape, but meanwhile Napoleon had determined to surrender himself into the hands of the English. After a residence of many years in the United States at Bordentown, N. J., where, as the Count de Sur-

villiers, he employed himself in agriculture, in 1841 Joseph was permitted to return to his wife, who had remained in Italy since 1815. He died in Florence, July 28, 1844. Joseph was the only one of his brothers for whom Napoleon professed any liking. He was a handsome, intellectual-looking man, of distinguished manners and polished speech. His wife, Julia Marie Clary, born Dec. 20, 1777, was the daughter of a wealthy citizen of Marseilles, and the sister-in-law of Bernadotte, King of Sweden. She was a quiet, unambitious woman, with no taste for the splendors of royalty, which fell to her share during Joseph's reign in Naples, for she never went to Spain. She died in Florence, April 7, 1845. By her marriage with Joseph she had two daughters: (1) Zénaïde Charlotte Julie (1801-54), who became the wife of Lucien Bonaparte's son, the Prince of Canino; (2) Charlotte Napoléone (1802-39), who married Louis Napoleon (died 1831), second son of Louis Bonaparte, King of Holland.

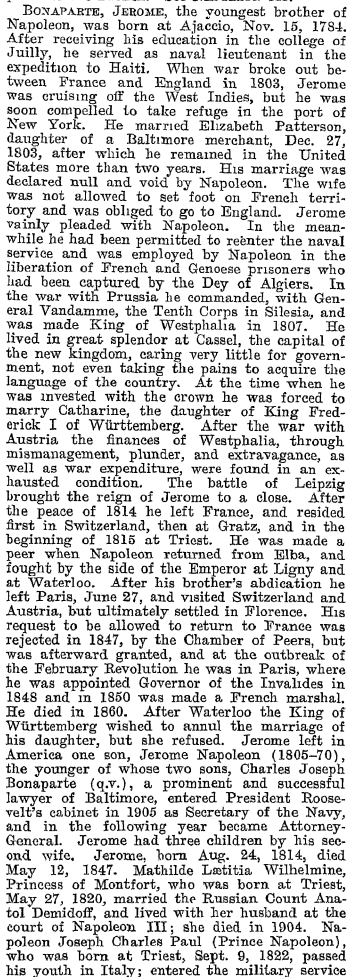
BONAPARTE, NAPOLEON. See NAPOLEON I. BONAPARTE, LUCIEN, Prince of Canino, and brother of Napoleon, was born March 21, 1775, and received his education at the college of Autun, the military school at Brienne, and the seminary at Aix. Rising gradually from one office to another, he was elected to the Council of Five Hundred, spoke against the wasteful distribution of state property, and formed a party favorable to the views of his brother Napoleon. Shortly before the 18th Brumaire (1799), he was elected President of the Council of Five Hundred, and as such was of signal service to his brother in securing the dictatorship of France. Afterward appointed Minister of the Interior, he was active in the encouragement of education, art, and science, and organized the prefectures. As Ambassador to Madrid, 1830, he contrived to gain the confidence of King Charles IV and his favorite Godoy, thus putting aside the British influence which had until then been exercised at the court of Spain. It is said that for his services in the treaty of peace concluded between Spain and Portugal, Sept. 29, 1801, he received 5,000,000 francs. But his constant opposition to Napoleon's progress towards monarchy involved Lucien in several misunderstandings with his brother, and their quarrel was brought to an issue by Lucien's second marriage against the wishes of Napoleon. He was exiled from France, went to Italy, and lived quietly at Canino in the province of Viterbo, near the frontier of Tuscany, where he devoted his time to art and science. Here he enjoyed the friendship of the Pope, who created him Prince of Canino; but having denounced in his private capacity the arrogant and cruel policy of his brother towards the court of Rome, he was "advised" to leave the city in which he was at that period residing. In 1810 he took ship for America, but fell into the hands of the English; was taken to England, and after a debate in Parliament was declared to be a prisoner, but treated with distinction. Upon his brother's downfall he returned to Rome. After the defeat of Waterloo Lucien maintained his presence of mind, advising his brother to dissolve the chambers and assume the place of absolute dictator. After the Restoration of Louis XVIII Lucien lived for some time in and near Rome. In 1830 he went to England, visited Germany in 1838, and died at Viterbo, June 29, 1840. Lucien possessed considerable talents and firmness of character. He

was in his early years an ardent Republican, but the weakness of the Directory convinced him that a military consulship was necessary to allay the social anarchy of France. He consequently threw himself eagerly into the designs of his brother, but protested against the establishment of a hereditary monarchy. As a writer he was by no means successful. His long and tedious epic poem, *Charlemagne, ou l'Eglise délivrée*, in 23 cantos, was written and published in London and was dedicated to the Pope (1814). Another heroic poem, *La Cygneide, ou la Corse sauvée*, followed in 1819. The *Mémoires secrets sur la vie privée politique et littéraire de Lucien Bonaparte* (2 vols., London, 1819), of which Alphonse de Beauchamp is supposed to be the author, is an untrustworthy book. Lucien was the father of a numerous family. In 1794 he married Christine Boyer, the daughter of a citizen of Saint Maximin. After her death he married, in 1802, the widow of a stockbroker, Madame Joubertion, who survived him. By his first marriage he had two daughters—Charlotte (1796-1865), who married Prince Gabrielli of Rome, and Christine (1798-1847), who married first a Swedish count named Posse, and then Lord Dudley-Stuart. By his second marriage Lucien had nine children. Charles Lucien Jules Laurent (eldest son of Lucien), Prince of Canino and Musignano, was born in Paris in 1803. He never exhibited any inclination for political life, preferring the pursuits of literature and science. He resided in Philadelphia from 1822 to 1828, during which time he studied the birds of the United States and wrote many technical papers published by scientific societies. He published *American Ornithology, or History of Birds Inhabiting the United States not given by Wilson* (Philadelphia, 1824-33), which came to be known as "Wilson and Bonaparte's Ornithology" and formed the basis for numerous subsequent editions of Alexander Wilson's great work. After his return to Europe he wrote extensively on American birds in German, French, Italian, and English. Among his works is *Iconografia della fauna italica*. The second son, Paul Marie, born in 1808, took a part in the Greek War of Liberation and died by the accidental discharge of a pistol, 1827. The third son, Louis Lucien (1813-91), distinguished himself by his studies in chemistry, mineralogy, and languages. Pierre Napoléon Bonaparte, the fourth son, born Sept. 12, 1815, passed through many changes of fortune in America, Italy, and Belgium, returning to France after the Revolution of 1848. In 1870 he shot a journalist, Victor Noir, for which he was tried at Tours, and acquitted of murder, but condemned to pay 25,000 francs to Noir's relatives. He died April 8, 1881. The youngest son, Antoine, born Oct. 31, 1816, fled to America after an affair with the papal troops in 1836, and returned to France in 1848, where he was elected to the National Assembly, 1849, but retired from politics in 1851. He died in 1877. The eldest daughter, Letizia (1804-71), married, in 1824, Mr. (afterward Sir) T. Wyse, an Irish gentleman, but a separation took place in a few years. The second daughter, Jeanne (1807-28), distinguished by her beauty and taste for poetry, died soon after her marriage with the Marchese Honorati. The third daughter, Alexandrine Marie, born in 1818, married, in 1836, Count Vincenzo Valentini de Canino, and gave birth to two sons and one daughter. Constanze, the youngest daughter

of Lucien, was born in 1823, became a nun, and died in Rome in 1876.

BONAPARTE, MARIE ANNE ELISA (1777-1820). The eldest sister of Napoleon Bonaparte. When Corsica was occupied by the English, she, with her family, emigrated to Marseilles, where she married Captain Bacciocchi, later created Prince of Lucca and Piombino. The elevation of Napoleon raised her also to rank and power, and in 1806 the principality of Massa and Carrara was intrusted to her administration, which was, on the whole, a beneficial one for the people. In 1809 she was made Grand Duchess of Tuscany. Here the arbitrary measures of her brother, which she had to carry out, and her own self-will and harshness, rendered her unpopular, and when the Allies entered Tuscany in 1814, she was forced to leave Florence.

BONAPARTE, LOUIS, third brother of the Emperor Napoleon, was born Sept. 2, 1778, and was educated in the artillery school at Châlons. Rising from place to place, he was made King of Holland in 1806, but, in fact, he was never more than a French Governor of Holland, subordinate to the will of his brother. He endeavored, however, to resist some of the demands of the Emperor and replied to one requisition by saying that, since he had been placed on the throne of Holland, he had "become a Dutchman." But Napoleon insisted on his submission, sent troops to Holland, and in 1810 annexed that country outright to France. Louis made no forcible resistance, he abandoned his throne, fled to Bohemia, and finally settled in Italy at Rome. Here he devoted himself for the most part to literature. He died in 1846. Louis Bonaparte was the writer of several works, *Marie, ou les Hollandaises*, 1814, a novel, giving some sketches of Dutch manners, *Documents historiques, etc., sur le gouvernement de la Hollande* (3 vols., London, 1821), *Histoire du parlement anglais* (1820), and a critique on M. de Norvins's *History of Napoleon*. His wife, the amiable and accomplished HORTENSE EUGÉNIE BEAUHARNAIS, the adopted daughter of Napoleon, Queen of Holland, and Countess Saint-Leu, was born in Paris, April 10, 1783. After the execution of her father she lived for some time in humble circumstances, until Napoleon's marriage with Josephine. In obedience to the plans of her stepfather, she rejected her intended husband, General Desaix, and married Louis Bonaparte in 1802. After the Hundred Days she visited Augsburg and Italy and then fixed her residence at Arenenberg, a mansion in the canton of Thurgau, where she lived in retirement. In 1831, when her two sons had implicated themselves in the Italian insurrection, the Countess traveled in search of them through many dangers and found the elder deceased and the younger, afterward Emperor of the French, ill at a place near Ancona. Returning with her son to Paris, she was pleasantly received by Louis Philippe and by Casimir Périer, but was obliged, in the course of a few weeks, to remove with her son to England. Thence she removed to her country seat, Arenenberg, where she died, after severe suffering, Oct. 3, 1837. She was the author of *La Reine Hortense en Italie, en France et en Angleterre, pendant l'année 1831*, and wrote several excellent songs. She likewise composed some deservedly popular airs, among others the well-known "Partant pour la Syrie," which the second Emperor of the French made a national air. Of her three sons, the



of Wurttemberg, 1837, afterward traveled in several countries of Europe, and was banished from France, 1845, on account of his intercourse with the Republican party. He returned to Paris with his father, 1847, and after February, 1848, was elected to the National Assembly. He commanded an infantry division of reserve at the battles of the Alma and of Inkerman in the Crimean War. In 1859 he married the Princess Clotilde, daughter of Victor Emmanuel, by whom he had two sons and a daughter. When war with Prussia was declared in 1870, Prince Napoleon proceeded on a diplomatic mission to his father-in-law, at Florence, but failed to obtain the cooperation of Italy with his cousin. After the fall of the Empire he took up his residence in England, but returned to France in 1872. On the death of the Prince Imperial, son of the Emperor Louis Napoleon, in Zululand in 1879, the eldest son of Prince Napoleon became the heir of the Bonapartist hopes. When, in 1886, the chiefs of the Bourbon family were, by a vote of both chambers, expelled from France, Prince Napoleon and his eldest son were exiled also. He died in 1911.

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BONAPARTE, LETITIA. MARIE WYSE, MME DE SOLMS-RATTAZZI-DE RUTE (1829-1902). A French author, born at Waterford, Ireland. She is supposed to have been a granddaughter of Lucien Bonaparte by his second wife, through the marriage of his daughter Letizia to Thomas Wyse, an Irishman. In 1850 she was married to Frederic de Solms, but after four years separated from him and, taking the title of Princesse de Solms, settled in Savoy, not then a part of France. Here she founded *Les matinees d'Asa* (1853) and gathered about her nearly all the celebrities of the day. Among her friends were Victor Hugo, with whom she kept up a correspondence, Kossuth, Eugene Sue, Lamartine, Lamennais, Dumas, Rochefort, and Tony Revillon. She contributed to the *Constitutionnel*, through Sainte Beuve, under the pen name of Baron Stock. After Savoy was annexed to France she went back to Paris and again kept open house, playing a prominent part in the literary and social events of the time. In 1863, De Solms having died, she married Urbain Rattazzi, a well-known Italian statesman, and lived

with him in Italy. After his death she returned to Paris. She outlived her third husband, Señor de Rute, a Spaniard, whom she married a few years after Rattazzi's death. Her writings consist of miscellaneous sketches, verses, plays, and novels. Among the latter are *Si j'étais reine* (1868), said to be autobiographical, and *Les mariages de la croix* (1866), reprinted under the title *La chanteuse* (1870). Consult also, Grierson, *Parisian Portraits* (New York, 1913).

BONAPARTE, PRINCE NAPOLEON JOSEPH PAUL. See BONAVENTURA, FAMILY OF.

BONAPARTE, PRINCE ROLAND (1858-). A French geographer, grandson of Prince Lucien Bonaparte, and great-nephew of Napoleon I. He became a member of the Institute and was twice president of the French Geographical Society. His publications include *Les habitants de Surinam* (1883), *Le théâtre Javanais* (1885), *Récents voyages des Néerlandais à la Nouvelle-Guinée* (3 vols, 1885), *Une excursion en Corse* (1891), *Documents de l'époque mongole des XIII^e et XIV^e siècles* (1896). His daughter Marie married Prince George, the second son of George I, King of Greece, in 1907.

BONAR, HORATIUS (1808-89). An English Free Church clergyman and writer of hymns. He was born in Edinburgh and educated at the university there. In 1837 he was ordained to the ministry at Kelso, where he remained nearly 30 years, when he was called to the Chalmers Memorial Free Church, Edinburgh. He edited several religious journals and published more than 20 volumes of a religious character, among them *Hymns of Faith and Hope* (3 series, 1857-68) and *Selected Hymns* (1879). He was author of the hymns "What a Friend We Have in Jesus," "I Heard the Voice of Jesus Say," "I Was a Wandering Sheep," and "Here, O my Lord, I See Thee Face to Face."

BONAR, JAMES (1852-). A Scottish educator and political economist, born at Col-lace (Perthshire). He studied at Glasgow University and Balliol College, Oxford, and in 1881 was appointed junior examiner in the English civil service commission. In 1895 he became senior examiner. He was in 1898 president of Section F of the British Association. Among his publications may be mentioned a translation (1877) of J. T. Beck's *Umriss der biblischen Seelenlehre, a Catalogue of Adam Smith's Library* (1894), *Parson Malthus* (1881), *Malthus and his Work* (1885), *Philosophy and Political Economy* (1893), *Elements of Political Economy* (1903), and *Disturbing Elements in Political Economy* (1911).

BONA'SUS. The aurochs. See BISON.

BONAVENTURA (1221-74). A saint and doctor of the Roman Catholic church. His real name was Giovanni Fidanza. He was born in 1221 at Bagnorea, in Tuscany. In 1238 he became a Franciscan monk, was a theological teacher in Paris, where he had studied, 1248-55, and in 1257 became general of his order. The influence of his character now began to penetrate the Church, and it was mainly through his eloquent persuasion that the cardinals were induced to unite (1271) in electing to the papal dignity Tedaldus Visconti (Gregory X). Gregory created Bonaventura Bishop of Albano and Cardinal in 1273, when he accompanied Gregory to the council at Lyons, where he died, July 15, 1274, worn out by his strict asceticism.

On account of his unspotted character from earliest youth, as well as the miracles ascribed to him, he enjoyed, even during his lifetime, especial veneration. Dante, who wrote shortly after, places him among the saints of his Paradiso; in 1482 he was formally canonized by Sixtus IV and in 1587 was ranked by Sixtus V as the sixth of the great doctors of the Church. The religious fervor of his style procured for him the title of *doctor seraphicus*, and his own order, the Franciscans, are as proud of him as the Dominicans are of Thomas Aquinas. A great part of his writings is devoted to the praise of his order, and to the defense of hyperdulia, celibacy, transubstantiation, communion in one kind, and other doctrines and practices much discussed in his day, which he treats in a philosophical manner. His most important works, the *Breviloquium* (Tubingen, 1845; 2 vols., Venice, 1874), and *Soliloquium*, are properly text-books on dogmatics. Unfortunately his efforts to philosophize the Church creed, and that deep mysticism in which his spirit reveled, make him often obscure and unintelligible even in his most popular treatises. With Bonaventura theology is the goal of all art and science; and in his *Itinerarium Mentis in Deum*, as also in his *Reductio Artium in Theologiam*, he represents union with God, to which the soul attains through six stages, as the highest good. He did more than any other of the early theologians to give a scientific form to the mystical theology. The *Biblia Pauperum*, or 'poor man's Bible,' attributed to him, is a mystico-allegoric explanation of the plain contents of the sacred books for the benefit of the laity. In warmth of religious feeling, however, and in the practical tendency of his ethics, he far excels most of his contemporaries. In his commentary on the *Sententiae* of Peter the Lombard, he acutely argued against the eternity of the world and also advanced some original proofs of the immortality of the soul. The most complete edition of his works appeared at Paris (15 vols., 1864-71). In modern English have appeared his *Life of St. Francis of Assisi* (London, 1868; 2d ed., 1876, New York, 1905); *The Month of Jesus Christ* (1882); and *Instructions for the Season of Lent* (1884). *The Life of Christ* (1881), *The Psalter of the Blessed Virgin* (1852), *The Mirror of the Blessed Virgin Mary* (Dublin, 1849), are works attributed to him. His *Itinerarium* is translated in the *Journal of Speculative Philosophy*, vol. xxi. Consult *Lexicon Bonaventurianum philosophico-theologicum* (Venice, 1880); and for his life, A. M. Vicenza (from the Italian, Paderborn, 1874); Skeay (London, 1889), and Costello, *Saint Bonaventura* (London, 1911). See PLATE of BIBLIA PAUPERUM.

BONAVENTURA, FATHER. A pseudonym of Charles Edward Stuart, adopted on his secret visit to England in 1753; mentioned in Scott's *Redgauntlet*.

BONAVINO, bō'ná-vē'nō, CHRIST. See FRANCOIS.

BONAVIS'TA (It. Good View). The capital of Bonavista district, on a bay of the same name, on the east coast of Newfoundland, 73 miles north by west of St. John's (Map: Newfoundland, G 4). It is a thriving port of entry and one of the oldest fishing stations on the island. The surrounding land is well cultivated. Islands and rocks make the navigation of the bay dangerous. The entrance is marked by a

lighthouse on Cape Bonavista, 150 feet above the sea. Pop., 1901, 3696; 1911, 3971.

BON'BRIGHT, DANIEL (1831-1912). An American educator, born in Youngstown, Pa. He graduated at Yale in 1850, was tutor there in 1854-56, and in 1858 was appointed professor of Latin language and literature in the Northwestern University, at Evanston, Ill. In 1899-1902 he was dean of that university's faculty of liberal arts and in 1900-02 was acting president.

BONCHAMP, bōn'shān', CHARLES MELCHIOR ARTUS, MARQUIS DE (1760-93). A Vendean chief. He was born at Joverdeil, in the old province of Anjou; took part in the American Revolution; and when he returned to France was made captain. Of strong Royalist principles, he looked with disfavor on the Revolution. After living for some 18 months in solitude, he allowed himself to be chosen leader of the Anjou insurgents. The Army of the Vendée would have been more formidable if Bonchamp's tactics had been adopted, but this was not done until it was too late. He fought at Bressuire and Thouars, and in the sanguinary encounter at Chollet, Oct. 18, 1793, received a fatal shot in the breast. He was generous and merciful in his warfare, and the lives of 5000 Republican prisoners are said to have been spared at his dying request. Consult Chauveau et Dussieux, *Vie de Bonchamp* (Paris, 1817).

BONCI, bōn'chē, ALESSANDRO (1870-). A famous Italian tenor. He was born at Cesena in the Romagna. Although he had a remarkable voice even as a child, he did not receive any training until his twentieth year, when he entered the Conservatory at Pesaro. Here he studied for three years under Pedrotti and Felice Coen. He began his professional career in 1893 as soloist in a church in Loreto, but continued his studies and also began to study operatic rôles. His début on the stage was made in 1896, when he sang Fenton in Verdi's *Falstaff* at Parma. His success was instantaneous, and he received an offer from the Dal Verme in Milan, where he first appeared in the title rôle of Gounod's *Faust*. Not long after this he was among the principal artists of La Scala, and his services were in demand at all the great opera houses of Italy. His first European tour took him from St. Petersburg to Paris. Everywhere his success was phenomenal. When in 1906 Hammerstein opened the Manhattan Opera House, New York, Bonci was his principal tenor. Immediately he was set up as the rival of Caruso, who was drawing great crowds at the Metropolitan, and so keen did this rivalry become that the Metropolitan Company did not rest until it had secured the new star in 1908. Bonci, however, did not remain long with the Metropolitan Company. In 1910 he resigned to devote himself chiefly to concert work, in which field he is one of the supreme artists. He was expected to be a member of the Chicago Opera Company in 1913-14, but was released from his contract. Caruso's voice is more powerful and has perhaps more sensuous charm, but in all other respects Bonci is his superior. It is impossible to imagine how any of the bel canto artists of Rossini's time could have had a more perfectly trained organ, responding to every demand. Withal, he never yields to the temptation of exploiting his flawless technic to dazzle his audience by feats of mere virtuosity. What impresses most in Bonci's art is his fine musicianship, his exquisite taste, and unerring

instinct for revealing the composer's most subtle intentions

BONCOMPAGNI, bôn'kôm-pa'nyé, PRINCE BALDASSARE (1821-94) An Italian mathematician, born in Rome His noted critical and historical work, *Scritti di Leonardo Pisano*, appeared in 1857-62 In 1857 he found at the Cambridge library a Latin translation of the famous arithmetic of Al Khwarizmi, which he published in Rome under the title *Algoritmi de Numero Indorum* All traces of this work had disappeared for 250 years His numerous historical monographs were published for the most part in the *Bullettino di Bibliografia*, in 20 vols, edited by him (Rome, 1868-88)

BOND See MASOKRY, BUILDING

BOND (same word as *band*, a fastening, from the verb to *bind*) In a legal sense, an obligation in writing and under seal by which one party termed the obligor, binds himself to pay a sum of money to another, termed the obligee A contract under seal to perform any other act or duty is generally termed a covenant Bonds belong to the class of specialty contracts and are of two kinds, *simple* and *conditional*—the former where provision is made for the payment of a sum of money only, the latter where a clause is added, in the nature of a defeasance, upon the performance of which the obligation is void, but upon the breach of which the obligation, regarded in the nature of a penalty, is payable The latter is the class to which the term 'bond' is more commonly applied in modern usage In form a bond consists of (1) the obligation by which the obligor binds himself, his heirs, executors, and administrators, to pay a certain sum of money; (2) any recitals necessary to explain the transaction, (3) the conditions, defining the acts on the performance or breach of which the obligation terminates In an ordinary surety's bond, or one for the payment of a debt, the obligation is for a sum double the amount of the debt, hence called a "penalty," but is wholly discharged by the payment of the debt with interest by the debtor Formerly the condition was often stated in a separate instrument called the "defeasance" Under the old common-law rule of nonperformance of the condition of a bond on the day fixed, the penalty was absolutely forfeited and recoverable by the obligee in full, but the courts of equity intervened to give relief against such penalty on the payment of the sum or damages actually sustained with interest due, and later statutes confined the recovery at law to the debt or damages actually suffered, so that now a bond amounts merely to the promise of payment of a sum of money, its form being sanctioned by antiquity One of the great advantages of a bond over an ordinary contract to pay money is that the period fixed by the statute of limitations, in most jurisdictions, in which to bring action is 20 instead of 6 years Where the obligation runs to more than one obligee, all should join in a suit, unless then rights are expressly declared to be several

In the United States a bond or like obligation to pay money is frequently accompanied by an instrument of security or mortgage upon the property of the debtor or obligor On default the obligee may at his election either sue upon the bond or enforce the payment from the security A similar usage prevails in the Scotch and English law, in the former, a mortgage of

real estate being commonly termed a *bond* See MORTGAGE

Corporations are generally empowered by their charters to borrow money by the issue of bonds These bonds have a definite period to run and bear a fixed rate of interest The entire bond issue is frequently secured by a mortgage made to a trustee for the bondholders upon the property of the corporation, under which the bondholders may, upon default of payment of principal or interest, foreclose upon the property in satisfaction of their claims This right greatly enhances the value of the security in the case of first mortgage bonds, but is of less value in the second and subsequent mortgage bonds so frequently issued by railroad corporations ANY obligations issued in a group by a corporation are called bonds when they bear a fixed rate of interest The entire bond issue is divided into part obligations, each of which is a bond, usually in sums of \$1000 each In form they are either registered or coupon bonds In the former case they are issued to individual owners, who in case of sale must authorize the transfer on the books of the corporation or its trustee to the purchaser Coupon bonds are payable to bearer and provide for the payment of interest by a series of notes (coupons) attached to the bond, which promise the payment of the interest, usually expressed as a specific sum of money, at the several interest periods As they fall due they are cut from the bond and presented directly or through a bank for payment They may be payable at the company's offices or at banking institutions named on the coupons

Bonds issued by governments are not supported by any mortgage, as no citizen can enforce a claim against the state For their security they rest, therefore, upon the confidence of the purchaser in the ability and good intentions of the issuing government to meet its obligations In the case of refusal by the government to pay the debt or interest the holder is without legal redress In some of the States of the Union the issue of bonds by the State governments and in all the States the issue of bonds by counties, school districts, towns, and cities is hedged about by constitutional provisions fixing the maximum amount of bonded indebtedness that may be incurred and, in some cases, limiting the purposes for which bonds may be issued See DEBT, PUBLIC, RE-PUDEIATION

Consult Cook, *Treatise on Stock and Stockholders* (3d ed, Chicago, 1894), Short, *Law of Railway Bonds and Mortgages* (Boston, 1897), Hainer, *Modern Law of Municipal Securities* (Indianapolis, 1898), Dillon, *Law of Municipal Bonds* (St Louis, 1876) Also the authorities referred to under the articles FORECLOSURE, MORTGAGE, TRUST, MUNICIPALITY

BOND, SIR EDWARD AUGUSTUS (1815-98) An English librarian and scholar, born at Hanwell After holding several minor positions in the British Museum, he became Keeper of the Manuscript Department in 1867, and from 1878 to 1888 was principal librarian In 1870 he founded (with E M Thompson) the Paleographical Society, of which he was long president It was he who brought about the printing of the British Museum catalogue He edited *Statutes of the Colleges of Oxford* (1853), *Speeches in the Trial of Warren Hastings* (1859-61), the *Travels of Jerome Horsey* (for

the Hakluyt Society), *Facsimiles of Ancient Manuscripts* for the Paleographical Society (5 vols., 1873-88), and other works. He was made C.B. in 1885, K.C.B. in 1898, and from Cambridge he received an honorary LL.D.

BOND, EDWARD AUSTIN (1849-). An American engineer, born at Dexter, Mich. From 1868 to 1889 he held positions with various railways in New York State as engineer, then for a time served as a consulting engineer, chiefly in the construction of water works, and in 1899-1904 was State engineer and surveyor of New York. He was chairman of the advisory board of consulting engineers for the Barge Canal, having in his hands charge of both plans and the earlier construction work (1910-11), and after that period was employed as consulting engineer by an Albany banking investment firm.

BOND, GEORGE PHILLIPS (1825-65). An American astronomer, the son of William Cranch Bond (q.v.), born at Dorchester, Mass. He was his father's assistant in the Harvard Observatory, succeeding to full charge in 1859. He was the first to apply photography to the observation of double stars. He published a *Treatise on the Construction of the Rings of Saturn*; *Elements of the Orbits of Hyperion and the Satellite of Neptune*; and several mathematical memoirs on mechanical quadratures and the method of least squares. For a work on Donati's comet he received a gold medal from the Royal Astronomical Society.

BOND, SIR ROBERT (1857-). A British-American political leader, born at St. John's, Newfoundland. He studied law and was elected to the Legislative Assembly in 1882 and two years later became speaker. In 1889 he was in the cabinet as Colonial Secretary. He was chiefly concerned in the negotiation of the Bond-Blaine reciprocity convention of 1890 with the United States, which was rejected by the British government, and was chairman of the Newfoundland deputation, at the Ottawa conference of 1895, regarding a union with Canada. From 1900 to 1909 he was Premier and Colonial Secretary, and negotiated with the United States the Hay-Bond reciprocity treaty which was signed at Washington, Nov. 8, 1902, but failed to secure ratification in the United States Senate. In 1902 he was knighted and made a member of the Imperial Privy Council. In 1906 he procured the passage of a resolution in favor of old-age pensions. He opposed the union of Newfoundland with Canada, and strongly favored a direct ocean route between Newfoundland and Ireland. After 1909 he was leader of the Liberal Opposition, but on January 10, 1914, by reason of alleged bad faith on the part of his political allies, the Fishermen's Union, he resigned the leadership and retired from political life.

BOND, WILLIAM CRANCH (1789-1859). An American astronomer, born in Portland, Me. He was self-educated, and had a private observatory at Dorchester, Mass., where his discoveries attracted much attention. In 1838 he was chosen by the United States government to make observations for the use of the Wilkes exploring expedition to the South Pacific, and in 1839 he supervised the construction of the observatory at Harvard and became its director. In 1848 he discovered Hyperion, the eighth satellite of Saturn, and two years later detected the so-called crap, or dusky, ring of that planet.

He was the inventor of the electro-chronograph, by means of which it is possible to measure time to a very small fraction of a second, and was among the first to employ photography in stellar observations. His publications include *On the New Ring of Saturn* (1851) and *Observations of Solar Spots, 1847-49* (1871).

BOND'AGE (LL. *bondagium*, inferior tenure, held by a husbandman, from *bondus*, AS. *bonda*, householder, husbandman). A form of rural tenure which obtains in Scotland, based upon an obligation of the tenant, called a bondager, to render agricultural services to his landlord. It is a survival, in modified form, of the base tenure of villeinage, which prevailed in the early history of feudalism (q.v.). Analogous to this term is the phrase *bond tenant*, sometimes used in English law to describe copyholders and customary tenants. See COPYHOLD; TENURE.

BONDER, bönd'är (Norw. *bonde*). In Norway and Sweden, the landowners or farmers. Under the ancient kings of Norway they were a powerful class, able to wrest important concessions from, and even to depose, their rulers. They correspond nearly to bourgeois and barons in England.

BONDI, bön'dë, CLEMENTE (1742-1821). An Italian poet, born at Mezzano, near Parma. He lived some time in Austria, where he fled after writing satirical poems on the Jesuits. He wrote a good translation of the *Æneid*, and much poetry in elegant academic style. His *Apologhi* have survived as a classic. His works were published in Vienna in 1808.

BOND'MAN, THE. 1. A tragedy by Massinger (1623). 2. A minor opera by Balfe (1846). 3. A novel by Hall Caine (1890), the scene of which is laid in the Isle of Man and Iceland.

BONDU, bön-doo', or BONDOU. One of the constituent states of the French colony of Senegal, between lat. 14° and 15° N., separated from Bambuk by the river Faleme. The soil is very fertile and well watered, yielding millet, indigo, corn, rice, and cotton. Gold and iron ores are found in considerable quantities. Cotton fabrics are woven by the natives, who belong to the Fulah race and number about 30,000. The predominant religion is Mohammedanism. The king resides in Bulbani, the capital, which has a population of over 2000.

BONDU'CA. The title of a tragedy by Fletcher, acted before 1619, but not printed until 1647. It was several times altered, one of the alterations bearing a new title, *Caractacus*. It deals with the unsuccessful defense of Britain by Boadicea against the Romans under Suetonius Paulinus. The same title was used for plays by Charles Hopkins (1697) and Richard Glover (1753).

BONDUKU. See BONTUKU.

BONE (AS. *bān*, Ger. *Bein*, bone, leg; cf. Icel. *benn*, straight). The hard material of the skeleton or framework of mammalian animals, reptiles, most fishes, and birds. In the embryo it is preceded by cartilage (q.v.), which consists of cells massed together except in the flat bones, as those of the skull and shoulder blade, of which the primary foundations are to a great extent of fibrous tissue. Points or centres of ossification form, the cells alter their shape and arrangement, and a deposit of earthy materials, phosphate and carbonate of lime, takes place, rendering the formerly flexible substance rigid. By soaking a bone in dilute min-

eral acid, we can dissolve these earthy matters and render it again flexible, ossein, or bone cartilage, alone remaining. If we expose it to intense heat, the animal matter (gelatin) is burned, and though the bone retains its form, a slight touch will cause it to crumble away. In the disease called rickets (qv) the inorganic matter is deficient, and the too flexible leg bones bend under the weight of the trunk. In the aged person, on the other hand, the bone substance becomes more densely packed with earthy matter and becomes brittle, rendering the bones peculiarly liable to fracture. Animals lower in the scale than vertebrates have, in place of bone, mineral concretions or incrustations, principally consisting of carbonate of lime. Besides constituting the skeleton, bone occurs in plates in certain animals, as in turtles' integument, the heart of certain ruminants, the tongue of certain fishes, etc. The specific gravity of bone is between 1.87 and 1.97.

The bones of the skeleton are classified according to their shapes—viz., as long bones (e.g., the thigh bone and arm bone), flat bones (as the shoulder blade and skull bones), short and irregular bones (as those of the wrist or spine). The substance of bones is arranged differently in different parts—either hard and close, which is called the condensed substance, or loose and reticulated, called the cancellated structure. Long bones have a shaft of hard substance, terminating at each end in soft or cancellated structure, in the latter situations the bone is more expanded and rounded off to enter into the formation of a joint. Irregular bones consist of a shell of condensed tissue, inclosing a mass of cancellated structure, and are smoothed off into surfaces adapted to those of the adjoining bones. Flat bones consist of two layers of hard tissue, with an intermediate cancellated structure. Anatomists class as *mixed bones* those which are both long and flat, as the ribs, the breastbone, and the lower jaw.

Histology. Bone belongs under the general histological classification of connective tissue, its hardness being due to the deposition in its intercellular substance of calcareous matter. Bones are covered externally by the periosteum (qv). They are well supplied with blood vessels, which are carried into them from the periosteum, the largest being those which enter the cancellated ends of the long bones. The long bones are hollow, the central canal being filled with marrow and lined by a membrane which receives a nutrient artery for the supply of the adjacent compact tissue. This vessel enters the bone rather above the mid-point and divides into two branches—an ascending and a descending—which subdivide and anastomose with the vessels entering the cancellated portion. After the arteries enter the compact tissue of bone they run in small capillary canals, which permeate the bone and anastomose, forming loops or meshes. The veins of bone are also contained in these canals and are larger than the arteries. These capillary canals are named "Haversian," after their discoverer, Clopton Havers, an English anatomist (died 1702). They vary in diameter from $\frac{1}{250}$ to $\frac{1}{100}$ of an inch. They take a longitudinal direction, and appear as holes when a transverse section is examined under a microscope. Each canal is surrounded by its own layers of bone, forming a sort of thick-walled cylinder with the Haversian canal as the centre. Between the layers are minute

spaces arranged concentrically around the Haversian canal. These are known as *lacunae*, and each one has radiating from it numerous small canals or *canaliculi*, which anastomose with canaliculi from other lacunae belonging to the same system and probably serve as lymph channels for the nutrition of the bone. The lacunae are not empty, but contain bone cells or corpuscles, which are nucleated bodies and send out fine processes into the canaliculi. In addition to the Haversian systems are irregular interstitial *lamellae*, or layers of bone, which fill in the spaces left between the systems. Along the surface of the bone, and also along the side of the central canal, the *lamellae* are arranged parallel to the surface, and are known as *circumferential lamellae*. The cavities of bones and the various nutrient channels which run through them are filled with a substance called *marrow*. In all bones of young animals and in the flat bones of adults the marrow is red in color. As the bone grows older the marrow of the long bones becomes yellow from the accumulation of fat. Marrow consists of a delicate connective-tissue network, in which ramify numerous small blood vessels. In the meshes of this network are found various kinds of cells—marrow cells, or large oval cells, giant cells, or myeloplaxs, large cells containing several nuclei, red-blood cells, nucleated red-blood cells, white-blood cells, connective-tissue cells, and fat cells. The periosteum is rich in blood vessels and invests the surface of all bones except where they articulate with other bones. Connective-tissue fibres ("Shapley's fibres") extend from the periosteum into the superficial layers of the bone.

With the exception of the flat bones of the head, all bones are first represented by masses of hyaline cartilage which resemble in shape the future bone. The cartilage is covered over with the primitive periosteum, or perichondrium. From this membrane blood vessels extend into the cartilage at some point, usually near the centre of a long bone, and a rearrangement of the cartilage cells occurs. This point is known as the *centre of ossification*. New cells, probably derived from the white-blood cells, appear and are known as osteoblasts. Each osteoblast surrounds itself with a little layer of bone and is then known as a bone cell. In compact bone the formation of the Haversian systems is due to the laying down of the bone in concentric layers around the blood vessels. During the development of bone within the cartilage (intra-cartilaginous development) bone is also being formed under the periosteum (subperiosteal development). Here, also, the bone is formed by the osteoblasts surrounding themselves by bone. The flat bones are not laid down in cartilage, but develop in a membranous connective-tissue matrix (intramembranous development).

Nerves may be seen entering bone, and the acute pain felt in some of its diseased conditions proves their existence, but they have not yet been actually demonstrated in the osseous tissue, neither have *lymphatics*, though we suppose, from analogy, that bones are supplied with them. The several bones composing the animal frame will be treated of under the head *SKELETON*, any important peculiarities in the bones of different classes of animals, under the heads of these classes.

Chemical Composition. The principal chemical ingredients of bone are gelatin and phos-

phate of lime; the following table gives the composition in 100 parts of bone of average quality:

Constituents	Human bones	Ox bones
Gelatin	33.30	33.30
Phosphate of lime	53.04	57.35
Carbonate of lime	11.30	3.85
Phosphate of magnesia	1.16	2.05
Carbonate and chloride of sodium	1.20	3.45
	100.00	100.00

The gelatin of bones remaining behind after treatment with dilute hydrochloric acid has the size and shape of the original bone, but is soft, somewhat transparent, flexible, and slightly elastic. If this soft, gelatinous residue of bone be boiled with water, it dissolves in great part and yields a solution which *sets*, or gelatinizes, on cooling. A common way of extracting the gelatin from bone is to heat the bones covered with water in a digester to a temperature of 270° to 280° F., when much of the gelatin dissolves out and leaves the inorganic salts with the remainder of the gelatin. Besides the marrow (q.v.), a little fat is generally found permeating the entire structure of the bone. In some of the larger bones of man and other mammalia, there is a central cavity containing a considerable amount of fatty matter, known as *marrow*. These cavities are not found in the bones of the young animal, but gradually form as the animal approaches maturity. In the sloth, cetacea, seals, and a few other animals, the cavities are absent. Occasionally, as in man, the elephant, giraffe, etc., the bones in the skull have cavities filled with air instead of marrow.

The uses to which bone may be put are various. In the cooking of soups bones form a constant ingredient, supplying gelatin, which gives a *body* to the soup. How far gelatin is of itself nutritious is a disputed question. See **GELATIN AND NUTRITION**.

Bone is largely used in manufactures. It is sometimes employed as a fuel where coal or wood cannot be obtained, and it furnishes a valuable fertilizing material. Consult Macewen, *Growth of Bone* (New York, 1912). See **BONE FERTILIZERS**.

BONE, HENRY (1755-1834). An English enamel painter. He was born at Truro, in Cornwall, Feb. 6, 1755, the son of a wood carver and cabinetmaker. In 1771 he was apprenticed as a china painter to William Cookworth in Plymouth, and afterward at Bristol to Richard Champion. In 1778 he went to London, where he painted aquarelle miniatures and enameled designs for jewelers. The success of his first portrait in enamel, that of his wife, caused him to devote himself entirely to this branch. In 1800 he was appointed enamel painter to the Prince of Wales, and in 1809 enamel painter to George III, the appointment being continued under George IV and William IV. In 1801 he was elected to the Royal Academy. His most important works are: "Muse and Cupid" (1789), the largest painting executed up to this time in enamel; an enamel copy of Titian's "Bacchus and Ariadne" (National Gallery), which was inspected by 4000 people and sold for 2200 guineas, a series of cavaliers distinguished in the Civil War; 28 portraits of

the Russell family of the time of Henry VII, still at Woburn Abbey; and 85 portraits of illustrious men and women of Queen Elizabeth's time, now in the collection of Mrs. Ralph Banks, Kingston Lacy, Dorsetshire. In 1831 he lost his eyesight and removed to Somerstown, where he subsisted on a small pension from the Royal Academy until his death from a stroke of paralysis, Dec. 17, 1834. As a painter in enamel he has rarely been equaled, perhaps deserving the title "Prince of Enamelers" bestowed upon him by his admiring countrymen. Two of his sons followed their father's profession. Consult J. Joze Rogers, "Notice of Henry Bone and his Works," in *Royal Institution of Cornwall Journal*, 1878-81, vol. vi.

BONE ASH. See **BONE FERTILIZERS**.

BONE BLACK, ANIMAL CHARCOAL, or CHAR. A substance prepared from carefully selected, clean, hard bones, made by heating them in retorts, out of contact with air, until they are carbonized. In this process combustible gases and water, together with oil and the vapors of various salts of ammonia, are given off, and bone black is left in the retort. It is generally reduced to coarse grains from about the size of small peas, down to large pin heads, and is extensively used in the arts for decolorizing liquids, such as the syrup of sugar, and solutions of argol (impure cream of tartar). It is capable of removing various mineral substances from their solutions and is therefore used in filters for separating chemical impurities from water. The general mode of using the bone black for the purpose of decolorizing liquids is to allow the liquid to percolate through a layer of the charcoal, when all color is arrested, and the syrup of sugar runs through clear and colorless. This power of absorbing coloring matters is possessed also by vegetable (peat or wood) charcoal, but not to such an extent as by bone black. The application of heat to the liquids before filtration greatly facilitates the decolorization, and where the volume of liquid to be operated upon is not great, the most expeditious method is to boil the liquid and bone black together and then strain through filtering paper or cloth. The power of absorbing colors is due to the process of adsorption, by virtue of which particles of solid, liquid, or gaseous matter adhere to the surfaces of the pores. When syrup of sugar and other liquids have been run through bone black for some time, the pores of the latter appear to get clogged, and the clarifying influence ceases; then the bone black requires to undergo a process of *renovification*, which usually consists in reheating it carefully in ovens, or iron pipes inclosed in a furnace, when the absorbed material is charred, and the bone black can be of service once again as an arrester of color. After several reburnings the bone black becomes of very inferior absorptive quality and is disposed of for the manufacture of fertilizers. Bone black has also the power of absorbing odors, especially those of a disagreeable nature, and can be employed to deodorize apartments, clothing, outhouses, etc. See **BONE FERTILIZERS**.

BONE BREAKER (for derivation see below). The giant fulmar petrel (*Ossifraga gigantea*), which is nearly as large as an albatross and belongs in the South Pacific. It breeds upon Kerguelen and neighboring islands and feeds mainly upon the carcasses of dead seals and cetaceans, the bones of which it is able to smash

with its powerful vulture-like beak. It is called "Nelly" by the sealers. See FULMAR, and Plate of FISHING BIRDS.

BONE CAVE See CAVE.

BONE CHINA A porcelain in which the body is fluxed with bone ash instead of feldspar. See PORCELAIN.

BONE COAL A term used especially in the anthracite regions to designate lumps of coal containing shaly matter. In the sizing and sorting of anthracite the bone coal has to be separated by hand or by machinery. See ANTHRACITE.

BONE DOG The bone shark. See DOGFISH.

BONE FERTILIZERS Bones have long been used and are highly valued as a fertilizer. Sir John Lawes, of England, early in his career, recognized their value for this purpose and established a factory for treating them with sulphuric acid to increase their effectiveness, according to the process suggested by Liebig. Bones are valuable as a fertilizer on account of the nitrogen and phosphoric acid they contain. The proportions of these depend upon the kind of bones, and the method of treatment to which they are subjected. Untreated bone consists chiefly of tricalcium phosphate bound together by gelatinous matter rich in nitrogen. The bones of younger animals are, as a rule, richer in nitrogen and poorer in phosphoric acid than those of older animals. The same is true of the softer bones as compared with the harder.

Raw Bones According to Voorhees, raw bones free from meat and excess of fat should contain about 22 per cent of phosphoric acid and 4 per cent of nitrogen. They are highly valued as a fertilizer, although they often contain a considerable amount of fat which interferes with their decomposition in the soil. Bones from which the fat has been removed may contain as high as 6 per cent of nitrogen and 20 per cent of phosphoric acid, are easily ground, and decompose readily in the soil.

Bone Meal, Bone Dust These are different names applied to the same thing, viz., very finely ground bone. The product may be finely ground raw bones, but it usually consists of bones which have been boiled, steamed, or extracted with solvents, such as petroleum or benzene, previous to grinding.

Steamed Bone A large part of the bone used for fertilizing is either boiled or steamed. This treatment removes the fat, which is valuable for various purposes, and the larger part of the nitrogenous matter, which is used for the preparation of gelatin and glue. Bones degelatinized by steaming contain from 28 to 30 per cent of phosphoric acid and 1.25 to 1.75 per cent of nitrogen. Steaming at a high temperature improves the mechanical condition of bones.

Dissolved Bones This is the term applied to the product resulting from the action of strong sulphuric acid upon bones. The acid converts the insoluble (tricalcium) phosphate into soluble (monocalcium) phosphate and calcium sulphate. This method of treating bones is, however, little used at present, because soluble phosphates are more easily and satisfactorily prepared from mineral phosphates (qv).

Bone Tankage This is a product which consists of bone mixed with meat scrap and blood or other slaughterhouse refuse in a fine state of division, and is usually richer in nitrogen and poorer in phosphoric acid than pure bone. Several different grades are recognized in the

trade, in which the phosphoric acid varies from 7 per cent (tankage, qv) to 19 per cent (nearly pure bone).

Bone Ash, resulting from the burning of bones, contains no nitrogen, and its fertilizing value depends entirely upon the phosphoric acid present. This is quite variable, but good samples should contain, according to Voorhees, from 27 to 46 per cent. Bone ash is applied as a fertilizer, either directly or after being converted into superphosphate (qv) by treatment with sulphuric acid, as in case of dissolved bones. Its use as a fertilizer is, however, limited.

Bone Black This is the product resulting from the carbonization of bones by heating in closed vessels. It is used for clarifying solutions, especially syrups, as a pigment, and as a fertilizer, either directly or after treatment with sulphuric acid. It is usually the spent bone black from refineries that is used in the manufacture of fertilizers. The bone black from this source is somewhat variable in composition, but usually contains from 32 to 36 per cent of phosphoric acid. Dissolved bone black, the form in which it usually appears as a fertilizer, contains about 16 per cent of phosphoric acid, readily assimilable by plants (available). See BONE BLACK.

The nature and composition of bone are such that it gradually yields its nitrogen and phosphoric acid for the use of the plant in the soil, and while it is sometimes treated with acid, as described above, to render its phosphoric acid more available, it is probably most effective when applied in the fine-ground condition and to slow-growing crops. It is especially valued for application to lawns and grass lands. Consult Lambert, *Bone Products and Manures* (London, 1913).

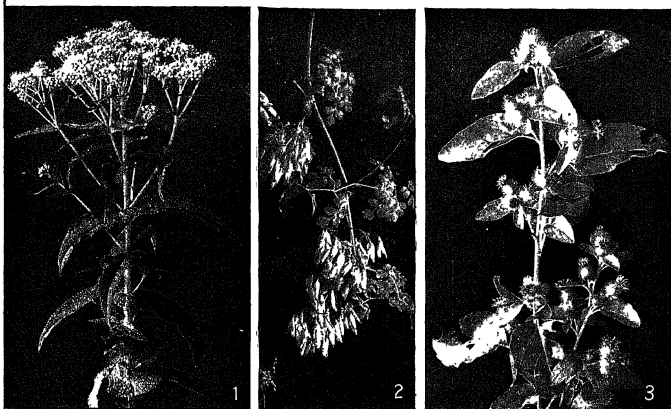
BONEFISH' See LADYFISH.

BONELLI, bô-nel'î, FRANCESCO ANDRÉ (1784-1830). An Italian zoologist. He was born at Cuneo (Piedmont), became a professor in the University of Turin, a director of the Museum in Turin, and a member of the Academy of Sciences there. He made extensive scientific journeys in Europe and published a number of highly esteemed works on entomology, such as *Specimen Faunæ Subalpinae* (1807).

BONER, bôn'ér, CHARLES (1815-70). An English author, born at Weston, near Bath. He was Vienna correspondent of the London *Daily News* and also wrote for the New York *Tribune* and other well-known newspapers. Many notable translations from the German were made by him, including particularly Hans Andersen's *Danish Story-Book* (1846) and *Dream of Little Tuck* (1848). His other works include *Chamois-Hunting* (1853), *The New Dance of Death* and *Other Poems* (1857), *Verses* (1858), *Forest Creatures* (1861), and *Transylvania: Its Products and its People* (London, 1865).

BONER, bôn'ér, or **BONERIUS**, ULRIKH. One of the oldest German fabulists. He was a preaching friar of Beirn and is frequently mentioned in documents of the years 1324-49. His collection of 100 fables and jests from Latin sources, entitled *Der Edelstein* (new ed. by Paul Kristeller, 1908), was published at Bamberg, 1461, and was one of the first German books printed. It is marked by purity of style and by clear and vivid delineation. This book is one of the greatest of bibliographical rarities, not more than two copies being known to exist. Bodmer

BONESET, ETC.



1. BONESET (*Eupatorium perfoliatum*).
 2. CLIMBING FUMITORY (*Adumia olrhosa*).
 3. BURDOCK (*Aroctum Lappa*).
 4. VIRGIN'S BOWER (*Clematis virginiana*).
 5. BURDOCK (*Aroctum Lappa*).

and Bretinger published a complete edition of the work at Zurich, in 1757, under the title *Fabeln aus Zeiten der Minnesinger*. Recent years have seen frequent reprints, notably in Reclam's *Universal-Bibliothek* (Leipzig, 1895).

BONES. Originally four pieces of the ribs of horses, or oxen, held in the hands and rapped together to mark time and rhythm. In early times the bones were called "knicky-knackers," a word originating in the old English *nakers*, mentioned in Chaucer's *Knight's Tale*. The fact that Bottom speaks of the "tongs and the bones" in *A Midsummer Night's Dream* is proof that they formed part of the rustic music in Shakespeare's time. They are still played by negro minstrels. See CASTANETS.

BONE/SET (so named from its medicinal properties) or THOROUGHWORT, *Eupatorium perfoliatum*. A perennial herb belonging to the family Compositae, native of the United States, and growing in moist soil. The leaves and flowering tops are used as a tonic. They have a strong, bitter taste and are taken in the form of hot tea to produce perspiration. If very strong, it operates as an emetic. To make bone-set tea, steep an ounce of dried leaves in a pint of water; let it stand two hours, and strain. Boneset is a domestic remedy for influenza, muscular rheumatism, etc. See EUPATORIUM.

BONE SPAVIN. See SPAVIN.

BON'NESS. See BORROWSTOUNNESS.

BONET, bō-nēt', JUAN PABLO (1560-?1620). A Spanish instructor of deaf-mutes, born in Aragón. Pablo Ponce de León, a Spanish monk, and Pasch, clergyman of Brandenburg, were earlier teachers of deaf-mutes, but Bonet was the first to publish a manual of method. Like De León, Bonet first taught his pupils to write the letters and then instructed them in their phonetic values. This is his *Reduccion de las letras y arte para enseñar a hablar a los mudos* (Madrid, 1620). His other works, important in his time, include *Tratado de las cifras y su enseñançia*; *Indice de las ligaduras y abreviaturas de la lengua griega*; *Discurso sobre la lengua griega y su instruccion*. See DEAF-MUTES.

BONET-MAURY, bō-nē'-mō'rē', AMY-GASTON (1842-). A French Protestant theologian and educator. He was educated at the Lycée Henri IV, in Paris, and in the divinity schools of Geneva and Strassburg, was pastor of Walloon churches in the Netherlands (1868-72) and of Protestant churches at Beauvais and Saint-Denis, and became (1879) lecturer in church history in the Paris Protestant School of Divinity. As librarian of the Musée Pédagogique he worked for the reform of French primary instruction; and he did much to spread the knowledge of the history of French Protestantism. He frequently served as a delegate to "parliaments" of religion and similar congresses. Among his works are: *Les origines du christianisme unitaire chez les Anglais* (1881); *Histoire de la liberté de conscience en France depuis l'Édit de Nantes* (1900); *L'Islamisme et le Christianisme en Afrique* (1906); *L'Unité morale des religions* (1912).

BONE TUMOR. See ACTINOMYCOSIS.

BONFIGLI, bōn-fel'ye, or BUONFIGLI, bwōn-fel'yo, BENEDETTO (c.1425-c.96). An Umbrian painter of the Renaissance. He was born in Perugia, where, according to Berenson, he studied under Beccafis. From 1450 to c.1453 he executed numerous paintings in Rome for

Pope Nicholas V, all of which have perished. At Rome his art was much influenced by Fra Angelico and his pupil Benozzo Gozzoli. In 1454 he began the most important work of his life, the frescoes of the chapel of the Priors in the Palazzo Pubblico, Perugia. The first half of the chapel was completed in 1461, but the remainder occupied him intermittently until his death. In this, the most important piece of decorative art in Perugia during the fifteenth century, his artistic development can best be followed. The subjects, chosen from the life of St. Louis of Toulouse and St. Herulanus, are unusual, and the painting is especially charming in its pagantry and in the quaint vistas of towns, but deficient in form and movement. Bonfigli also painted many standards with customary religious subjects for the churches of Perugia and the neighboring towns, which still survive, such as those of San Francesco (1464), San Bernardino (1468), San Firenze (1466), all in Perugia. His panel paintings are most numerous in the gallery of Perugia.

BONFIRE (originally *bonafire*, as in a gloss of 1483; "*bonafyre, ignis ossium*," i.e., fire of bones). In its earliest usage, a funeral pyre, a fire lighted to consume heretical or forbidden books, etc.; in the early superstitions of Germany (where it was also called *Notfeuer* or needfire) and most other European nations, a fire kindled in time of pestilence among men or cattle to drive away the disease. Later, the kindling of such fires, with many traditional ceremonies, became a regular part of the observances on the night before the festival of St. John the Baptist or Midsummer Day—still with the ancient idea of driving away plagues and evil spirits. The casting of effigies into the flames, still observed in some places, seems to point to a survival of ancient propitiatory sacrifices. It is quite likely that all these ceremonial observances are relics of pagan worship of the heavenly bodies, modified by the introduction of Christianity. The Church, as in many other instances, preferred to adopt and consecrate what would have been almost impossible to suppress; thus the inclusion in the Catholic Easter ceremonies of the blessing of the new fire and the custom in the Russian Church of carrying lighted tapers on that festival may be related to the custom of the *Osterfeuer* among the Teutonic nations, which originally was probably celebrated on the 1st of May. Consult: Jahn, *Die deutschen Opfergebräuche bei Ackerbau und Viehzucht* (Breslau, 1884); Brand, *Popular Antiquities*, vol. i, ed. by Ellis (London, 1849); and Frazer, *Golden Bough*, vol. ii, iii, and iv, 3d ed. (London, 1911, 1913). For the customs more particularly associated with the Celtic races, see BELTANE.

BONGAR, bōng'gar (native name). A serpent; genus *Bungarus*. See KRAIT.

BON GAULTIER, bōn gō'tyā', BALLADS OF. The title of a satirical volume of verse by Prof. William Aytoun and Theodore Martin, published in 1854. The ballads originally appeared in *Blackwood's Magazine*, were mostly on the topics of the day, and included some excellent parodies.

BONGHI, bōng'gē, RUGGERO (1828-95). An Italian man of letters and a politician, born in Naples. His share in the political events of 1848 forced him into temporary exile. A chance meeting at Lake Maggiore with Manzoni

and Rosmini-Serbatì soon bore fruit in his much-discussed *Critical Letters on the Reason Why Italian Literature is Not Popular* (3d ed., 1873). He remained an active and acute exponent of Manzoni's theory of language and aesthetics. In 1858 appeared his translation of Plato, *Opere di Platone*, and of the *Metaphysics* of Aristotle, and the following year he refused to receive from Austria a chair of philosophy in the University of Pavia, but afterward accepted it from his own country, when Pavia had reverted to Italy. Thereafter he was connected successively with the universities of Turin, Florence, Milan, and finally (1870) Rome, where he was professor emeritus of ancient history at the time of his death. Bonghi was a man of great activity and many interests. From 1860 he sat almost continuously in the Chamber of Deputies, where he supported the Conservative party. In 1874-76 he was Minister of Public Instruction. In journalism he was equally active, editing successively the *Perseveranza* of Milan, and the *Unità Nazionale* of Naples, and founding the *Stampa*, which is still the leading journal of Turin, and the magazine, *Cultura*, which he edited until his death in 1895. He was for many years president of the Italian Press Association. Among his many published works may be mentioned *Pius IX and the Future Pope* (1877), *Leo XIII and Italy* (1878), *Contemporaneous Portraits: Cavour, Bismarck, Thiers* (1879), *Dissacels and Gladstone* (1882), *History of Rome* (1884-88), *Arnoldo da Brescia* (1884), *The Roman Festivals* (1891). Consult F. D'Ovidio, *Rimpanti* (Palermo, 1903).

BONGO, bō'ngō. A name applied to a negro people dwelling in the upper Nile basin, between the Dinka and the Zande. They are slightly blended with Hamites. They are of reddish skin and medium stature and are vigorous and fleshy, with crisp hair. They subsist by the chase, upon their flocks, and by agriculture. They are skilled in the working of iron. Their neatly thatched houses and granaries are conoid in shape, and the former are surmounted with lookouts. Little costume is worn, but the Bongo are fond of adornment. The women tattoo the upper part of the body and wear labrets in the upper lip, straws through the alae of the nostrils, and rings through the septum of the nose. Consult Schweinfurth, *Artes Africanae* (Leipzig, 1875) and *Heart of Africa* (New York, 1874).

BONGO. A large West African bush buck (q.v.).

BONHAM, bōn'am. A city and the county seat of Fannin Co., Tex., about 75 miles northeast of Dallas, on the Texas and Pacific and the Missouri, Kansas, and Texas railroads, and on the Red River (Map Texas, D 3). It is the seat of Carlton College (Christian), opened in 1867. The city is the centre of a fertile agricultural district and has a large export trade in fruit, cotton, grain, flour, and live stock. The industrial establishments comprise flour mills, cotton gins, cotton and cottonseed oil mills, a creamery, and ice factory, railroad machine shops, carriage and wagon works, planing mills, etc. The water works are owned by the city. Pop., 1900, 5042; 1910, 4844.

BONHAM, MILLEDGE L. (1815-90). An American soldier and statesman. He was born in South Carolina and in 1834 graduated at the South Carolina College. He served in the Mexican War and was a State's-rights Democrat in

Congress from 1856 to 1860, but withdrew when his State passed the ordinance of secession and was made a major general in the Provisional army of South Carolina. In 1861 he entered the Confederate army as brigadier general, and led a brigade at the battles of Blackburn's Ford and Bull Run, but resigned his commission (1862) to take a seat in the Confederate Congress. He was Governor of South Carolina from 1862 to 1864, when he returned to the army and served until the close of the war.

BONHEUR, bo'nēr', AUGUSTE FRANÇOIS (1824-84). A French animal painter. He was born at Bordeaux and, after studying with his father and his sister Rosa, entered the Ecole des Beaux-Arts. Beginning as a genre and portrait painter, he soon adopted animal painting under his sister's influence. Although his animals are inferior to hers, the landscape backgrounds are better, being more harmonious in color. His work is often marred by too much attention to detail. His principal productions include "Watering-Trough in Brittany" (1859), "Cattle Leaving the Pasture" (1861), "A Brook in Auvergne" (1863), "Le Dormeur" and "Ruins of the Castle of Apehon" (1867), and "Woodland and Cattle" (1890, Metropolitan Museum, New York). He received gold medals of the first class in 1861 and 1863 and the cross of the Legion of Honor in 1867.

BONHEUR, ROSA (MARIE ROSALIE) (1822-99). A French artist, considered the most eminent woman painter of animals. She was born at Bordeaux, Oct. 22, 1822, the daughter of a drawing teacher who afterward became the director of the Free School of Design for girls in Paris. Her remarkable talent and repugnance to dressmaking, the avocation chosen for her by her father, finally moved him to place her in his own school, and she also studied under Cogniet, but it was mainly her own study of animals in their natural environments that developed her ability. At the age of 19 she first exhibited at the Salon "Goats and Sheep" and "Two Rabbits," and until 1855 she was represented annually. In 1845 she received a gold medal of the third class, and in 1848 a first-class medal. Her first great picture, deemed by some her best, "Ploughing in the Niveinai" (1849), a commission from the state, is now in the Luxembourg. A summer in the Pyrenees, 1850, resulted in several important pictures. In her studies at the abattoirs on the outskirts of Paris, finding the attentions of the workmen disagreeable, she adopted man's attire, resembling the Breton, in which she henceforth painted. In 1853 she exhibited the famous "Horse Fair," which attracted widespread admiration. She offered it to her native town of Bordeaux for 15,000 francs, but the offer was not accepted, so she sold it in England for 40,000 francs, and it was finally purchased by Cornelius Vanderbilt for the Metropolitan Museum of Art in New York City for 268,000 francs. A copy, retouched by the artist, is in the National Gallery in London. Another important work of her early period was the "Hay Harvest in Auvergne" (Luxembourg), in fine afternoon light.

In 1856 Rosa Bonheur bought a Gothic château at By, near Fontainebleau, where she passed nearly all the remainder of her life. Here, in 1864, Napoleon III and the Empress Eugénie visited her, and the year following the Empress in person brought her the cross of the Legion of

Honor. A visit to Scotland was the occasion of a number of Scottish subjects, such as "Ponies of the Isle of Skye" and "Sheep in a Boat" (1867). Among the most noteworthy of her remaining paintings are "Cattle and Sheep in Pasture" (1860); "Sheep in Repose" (1860); "Wagon with Six Horses" (Wallace Collection, London); and "Foulaision," a troop of galloping horses—the masterpiece of her last period. In 1894 she received the officer's cross of the Legion of Honor, the first woman to achieve that distinction. In the Metropolitan Museum of Art, New York, are her "Deer in the Forest," "A Limier-Briquet Hound" (1877), and "Weaning the Calves" (1879), and in the Public Library, New York, is her "Deer Drinking." She died in Paris, May 25, 1899. As a painter she showed a sound and wholesome feeling for nature, not only in the modeling of her animals and in her spirited representations of action, but also in the truthful landscape setting in which she placed her subjects. Her drawing and composition are good; but the color is often hard, and the atmosphere is often imperfectly rendered. For her life and works, consult René Ménard, in *The Portfolio* (London, 1875); René Peyrol, in the *Art Annual* (ib., 1900); Roger-Miles (Paris, 1900); and especially the monograph by Klampke (ib., 1908), containing her autobiography and fine illustrations of her works.

BONHOMME, bônôm', JACQUES (Fr. James Goodman). A term of deprecation applied by the French nobility and others to one of the masses, more narrowly to the peasant.

BONHOMME RICHARD, rêshûr', THE. See JONES, JOHN PAUL.

BONI, bônê. Formerly an important kingdom occupying the southwestern part of Celebes (q.v.), covering an area of about 1000 square miles (Map: East India Islands, F 5). It was only with considerable difficulty that the Dutch succeeded in establishing their authority there in 1860. At the beginning of the century the British were compelled to send several expeditions against the Bonese for interfering with the British sea trade. Chief products include sugar cane, rice, coffee, tobacco, and cotton. A good breed of horses and buffaloes is raised. The population of Boni, which consists mainly of Bugis, is estimated at from 200,000 to 300,000. Capital, Boni, on the east coast.

BONI, GIACOMO (1859-). An Italian architect and archaeologist, born in Venice. He directed excavations of the Roman Forum and the Palatine Hill and is author of many important works on art and architecture, including: *L'avvenire dei nostri monumenti* (Venezia, 1883); *Sul Ferro Ossidabile* (Venezia, 1884); *Vecchie mura* (1885); *The Ca' d'Oro and its Polychromatic Decorations* (1887); *Imbellettata* (1887); *Il Catasto dei monumenti in Italia* (1892); *Lagons of Venice* (1898); *Studi Danteschi in America* (1898). He wrote also: *Ædes Vestæ; Fons Tuturnæ; Prisco-Latin and Romulean Sepulchretum in the Roman Forum; Methods of Archaeological Excavations; Hibernica; Forum Ulpium; Trajanic Legends and the Column of Trajan; The Tower of St. Mark, Venice*, etc.

BONIFACE. The name of nine Popes. BONIFACE I (Pope, 418-422), on account of prevailing party divisions, was opposed by a rival bishop, but was recognized by Honorius as his proper successor. His letters are in Migne, *Patrol. Lat.*, xx.—BONIFACE II (Pope, 530-532).

His letters are in Migne, lkv.—BONIFACE III, who was Pope for only 10 months in the year 607, was the first to whom the title of Universal Bishop of Christendom was conceded by the Greek Emperor (Phocas).—BONIFACE IV (Pope, 608-615).—BONIFACE V (Pope, 619-625).—BONIFACE VI (Pope, 806).—BONIFACE VII (Pope, 974, 984-985).—BONIFACE VIII (Benedetto Gaetano, Pope, 1294-1303). He was born at Anagni, and was elected Pope on Dec. 24, 1294. In 1296 Boniface issued his bull *Clericus Laicos*, forbidding the payment or collection of taxes on ecclesiastical property without the consent of the holy see. He failed in his attempts to assert a feudal superiority over Sicily and to exercise his papal authority in the disputes between France and England. Philip the Fair, of France, supported by the estates and clergy, maintained the independence of the kingdom, disregarding many bulls and briefs, and even the sentence of excommunication to which the Pope proceeded. Philip at last, with the aid of Italian enemies of Boniface, made him prisoner at Anagni, whither he had fled; and although he was liberated by the people of Anagni after two days' imprisonment, he died within a month (Oct. 11, 1303), in consequence of having refused food during those two days, through fear of poison. He instituted the Roman Jubilee in the year 1300 and in 1302 issued the bull *Unam Sanctam*, wherein he maintained the necessity of the submission of princes to the spiritual jurisdiction of the Roman pontiffs. For his life, consult: Luigi Tosti (2d ed., Milan, 1848, French trans., Paris, 1854); W. Drucmann (Königsberg, 1852).—BONIFACE IX (Pietro Tomacelli, Pope, 1389-1404). He was a native of Naples, and succeeded Urban VI as Pope at Rome, while Clement VII was Pope at Avignon. His financial expedients contributed chiefly to increase the many already existing abuses in the disposition of ecclesiastical offices. He acquired, after a struggle, almost absolute power in Rome, which he kept in awe by fortresses; but to secure himself against external enemies, particularly Louis of Anjou, whose claim to the crown of Naples he had opposed, he was obliged to give away part of his territory in fiefs, as Ferrara to the house of Este. Consult: Morum, *Popes in the Early Middle Ages* (St. Louis, 1902-); McKilliam, *A Chronicle of the Popes* (London, 1912).

BONIFACE, SAINT (680-755). The Apostle of Germany, whose original name was Winfrid. He was born at Crediton, in Devonshire, England, 680. He first entered a monastery in Exeter at the age of 13, and afterward removed to that of Nuthalling, where he learned rhetoric, history, and theology, and became a priest at the age of 30. At that time a movement, proceeding from England and Ireland, was going on for the conversion of the still heathen peoples of Europe; in 614 Gallus and Emmeran had been sent to Alemannia, Kilian (murdered 689) to Bavaria, Willibrord (died 738) to the country of the Franks, Swidbert to Frisland, and Siegfried to Sweden. Winfrid also took the resolution (715) 'of preaching Christianity to the Frisians, among whom it had as yet found no entrance. But a war broke out between Charles Martel and the King of the Frisians, and Winfrid returned from Utrecht to his convent, of which he was elected abbot. He declined the election, repaired to Rome in 718, and received the authorization of Pope Gregory II to

preach the Gospel to all the tribes of Germany in 719. He first went to Bavaria and Thuringia, then labored three years in Friesland, and traveled through Hesse, everywhere baptizing multitudes, and consecrating their idolatrous groves as churches. In 721 Gregory II called him to Rome, made him bishop (722), with the name of Bonifacius, furnished him with new instructions or canons, and with letters to Charles Martel and all princes and bishops, requesting their aid in his pious work. Returning to Hesse and Thuringia (723), he destroyed the objects of heathen worship (among which are mentioned an oak at Geismar, near Cassel, sacred to Thor, and an idol named Stufio, on a summit of the Harz still called Stufenberg), founded churches and convents, and called to his aid priests, monks, and nuns from England, whom he distributed through the various countries. In recognition of his eminent services, Gregory III sent him (732) the pallium, and named him Archbishop and Primate of all Germany, with power to establish bishoprics wherever he saw fit. Boniface now made a third journey to Rome (738) and was appointed Papal Legate for Germany. The bishoprics of Ratibon, Erfurt, Paderborn, Würzburg, Eichstadt, Salzburg, and several others owe their establishment to St. Boniface. The famous abbey of Fulda is also one of his foundations (742-744). He was named Archbishop of Mainz by Pepin (744), whom he consecrated as King of the Franks at Soissons (752), and he presided in the council held at that place. In 754 he resigned his archbishopric at Mainz and resumed anew his apostolic labors among the Frisians, and at Dokkum, near Leeuwarden, in West Friesland, this venerable Christian hero was set upon by a mob of armed heathens and killed, along with the congregation of converts that were with him (June 5, 755). His remains were taken first to Utrecht, then to Mainz, and finally to Fulda. In the abbey there is still shown a copy of the Gospels written by him. A collection of his letters, and the canons he promulgated for the discipline of the newly established churches, have been preserved. The best edition of his *Letters* (Epistolae) is that of Dümmler (1892). In 1811 a monument was erected to St. Boniface on a hill near Altenberga, in the Principality of Gotha, where, according to tradition, he erected (724) the first Christian church in north Germany. A statue by Henschel of Cassel was also erected to him in Fulda in 1842. His works are in Migne (*Pat. Lat.*, lxxxix), also ed. Giles (2 vols., London, 1844), for his *Life*, consult G. W. Cox (London, 1853), A. Werner (Leipzig, 1875), *Life of St. Winfrid—the traditional life* (London, 1878), O. Fischer (1880), Kurth (2d ed., 1902), A. Ehrhard (Gutersloh, 1882); W. Levison, *Vita Sancti Bonifatii* (Hanover, 1905), Schnuerer, *Die Bekehrung der Deutschen zum Christentum. Bonifatius* (Berlin, 1909). Tosti, *History of Pope Boniface VIII and His Times* (New York, 1911), Pastor, *The History of the Popes* (London, 1906-12).

BONIFACIO, bō'ne-fa'chō, STRAIT OF. The ancient Fretum Gallicum, between Corsica and Sardinia, it took its modern name from the little fishing town of Bonifacio, which is at the southern extremity of Corsica (Map Italy, D 6). The strait, which is 7 miles wide at its narrowest part, is dangerous to navigate on account of the swift current and the rocks and at

times tempestuous winds. Ovster, tunny and coral fisheries are prosecuted in its waters.

BONIFACTUS, bōn'f-fa'sht-us. A Roman general of the fifth century A.D. He fought against the Goths at Malsilla in 413 and against the Vandals in Spain in 422. He was subsequently Governor of Africa under Valentinian III and appears to have been successful in his administration. Having been maliciously advised by Actius (q.v.) that the Regent Placidia purposed his death, he unwisely invited the Vandals under Genseric to settle in Africa. Afterward, when he perceived that he had been duped, he endeavored to expel the barbarians, but was himself besieged at Hippo, whence he escaped to Italy, in 432. Here he regained the favor of the Regent, but was challenged by Actius to single combat, and died of his wounds soon afterward. Consult *The Cambridge Medieval History*, vol. 1 (New York, 1911).

BONIFAZIO, bō'ne-fa'tsē-ō, VERONESE, properly BONIFAZIO DI PITATI, sometimes called BONIFAZIO VENEZIANO (1487-1553). An important Venetian painter of the Renaissance. He was born at Verona (whence his name), the son of a soldier named Pitati, who probably removed to Venice in 1505. Until quite recently it was supposed, following the clever criticisms of Morelli, that there were three painters of this name: Bonifazio the Elder (I) (died 1540), the most important of the group, his brother, Bonifazio the Younger (II), a somewhat weaker artist, and Bonifazio (III) Veneziano, a son and pupil of either of the above, the least important of the group. The pictures of important European galleries were renamed accordingly. But the recent researches of Dr. Gustav Ludwig in the Venetian archives have proved that the family name of the painter who died in 1540 was Pasini and that he passed practically all his life in Verona, and that the work ascribed to the hypothetical Bonifazio III consisted entirely of decorative paintings assigned to Bonifazio di Pitati, executed for the most part by his pupils. Consequently there was only one painter named Bonifazio Veronese of the Venetian school. He was a pupil of Palma Vecchio and was influenced by Giorgione. Among his earliest works, which resemble Palma's, are a number of delightful *Sante Conversazioni* (q.v.), such as those in the Pitti Palace (Florence), the Ambrosiana (Milan), the National Gallery, London, the Louvre, the Museum of Vienna, and the Gardner Collection, Boston. The number of highly finished works of his best period, upon which his fame principally rests, is small. The best known are "Flight into Egypt" (Pitti), "Rich Man's Feast" (Academy, Venice), and the "Finding of Moses" (Brera, Milan). His most important commission was the decoration of the Palazzo Camerlengo with a great number of paintings, most of which are now in the Venetian Academy and the Museum of Vienna. They were begun in 1531, and the earliest, like "Christ Enthroned with Saints" and the "Judgment of Solomon" (Academy, Venice), are by his own hand, but about 1541 failing health impaired the quality of his work, which had to be entrusted more and more to his numerous pupils. At his best Bonifazio was one of the finest colorists and ablest painters of the Venetian school. His work, both in form and in color, was a development of that of Palma Vecchio. Consult Morelli, *Critical Studies of Italian Painters* (London, 1892-93), Ludwig, "Bonifazio di Pitati," in

Jahrbucher der koniglich preussischen Kunstsammlungen, xxii, xxiii (Berlin, 1901-02).

BONILLA Y SAN MARTÍN, bō'nel-ya' c sán mār-tén', ADOLFO (1875-). A Spanish humanist, juriconsult, and historian of literature and philosophy. He was born Sept. 27, 1875, at Madrid, and after the usual preliminary studies in the humanities, he followed the advanced courses at the Madrid University, receiving doctorates in philosophy and letters, and in jurisprudence. After serving several years as professor of commercial law at the University of Valencia, he went to the Madrid University, to accept a chair in Spanish literature and philosophy. For some years he was secretary of the Ateneo Científico, Literario y Artístico of Madrid. In 1911 he was elected to membership in the Real Academia de la Historia of Madrid. The breadth and depth of his scholarship and interests will best be shown by the following selected but representative list of his publications: *Concepto y teoría del Derecho* (1897); *Gérmenes del feudalismo en España*, etc. (1898); *Estudios de historia y filosofía jurídicas* (1909); *Arte Simbólico* (1902); critical and annotated editions of several important texts, *Erasmus en España* (1907); *Luis Vives y la Filosofía del Renacimiento* (1908); *Historia de la Filosofía Española* (1908-), 2 vols. have appeared; and *Fernando de Córdoba . . . y los orígenes del renacimiento filosófico en España* (1911).

BONIN, bō-nēn', EDUARD VON (1793-1865). A Prussian general, born at Stolp (Farther Pomerania). In 1806 he entered the infantry regiment of Brunswick-Oel, was at Jena and Lübeck, and rose in 1829 to be major. Promoted in 1842 to be colonel, he commanded a Prussian brigade in the War of 1848-49 and, having served as commandant of Berlin, was appointed Prussian Minister of War in 1852. He retired in 1854, was again appointed in 1858, but a second time retired in 1859 and was appointed general commanding the Eighth Army Corps at Coblenz. He published a military work entitled *Grundzüge für das zerstreute Gefecht* (1839).

BONIN (bō-nēn') **ISLANDS** (Jap. *Ogasawara-jima*). A group of small islands in the Pacific, belonging to Japan and situated between Japan and the Ladrones Islands, in about lat. 27° N. and long. 142° 20' E. and about 500 miles south of Tokyo (Map. World, Eastern Hemisphere, § 35). The entire archipelago occupies an area of about 27 square miles and is divided into three groups—the Parry Islands on the north, the Beechey Islands in the centre, and the Coffin or Bailey Islands in the south. The entire number is 20, of which only 10 are of any considerable size. They are of volcanic origin, and but few of them are inhabited. The chief products are sugar and indigo. The main port is Port Lloyd, on Peel Island (*Chidjima*). The population, Dec. 31, 1908, was 3595. According to Japanese annals, the islands were discovered in 1593 by Ogasawara Sadayori, whence the name Ogasawara-jima (*jima*, islands). They were also called Munin or Bunin ("without inhabitants"), whence Bonin. The Japanese practically abandoned the islands, and in 1830 a small party, including two Americans, two British, and some Hawaiian natives, settled on Peel Island. This colony regarded itself as British; it numbered 31 when Commodore Perry arrived in 1853 and 69 in 1875. The group has belonged to Japan since 1876 and is attached to the Tokyo fu.

BONINGTON, bōn'ing-tūn, RICHARD PARKES (1801-28). A genre and landscape painter of English descent, who was trained and practiced in France. He was born near Notting-ham, Oct. 25, 1801, the son of an amateur painter, who founded a lace manufactory near Calais. The boy sketched at three and derived his first artistic training with Louis François at Calais. His skill in water color won him the friendship of Delacroix and led to his enrollment at 15 in the Ecole des Beaux-Arts, after which he also worked with Baron Gros. He made his début as an exhibitor in the Salon of 1822, and in 1824, along with John Constable and Copley Fielding, he won the grand medal of honor. He painted with Delacroix in England (1825) and afterward studied in Italy, particularly at Venice (1826). From 1826 to 1827 he exhibited at the Royal Academy and in the British Institution at London. Returning to Paris, he played an important part in the artistic development of France. A victim of tuberculosis, he died in London, Sept. 23, 1828. In training as well as in his subjects Bonington belongs to the French rather than to the British school. At an early period he adopted the English plain-air methods, and was with Constable instrumental in their introduction into France and consequently to their later development by the painters of Barbizon. His drawing is delicate, his brush work facile, his color glowing. His subjects are chiefly seashore and street scenes, and also occasionally he painted historical genre pictures of much originality. He excelled especially in water colors. The largest and finest collection of his works is in the Wallace Gallery, London,—10 oils and 23 water colors. He is also represented in the Louvre, the National Gallery, South Kensington Museum, London, several provincial museums of England, and in the Metropolitan Museum of New York. A critical edition of his life was published by Bouvenne (1873). Consult Mantz, in *Gazette des Beaux-Arts* (Paris, 1876); Frantz, in the *Studio* (London, 1905); Hadard, *Les lithographies de Bonington* (Paris, 1891).

BONITO, bō-nē'tō (Sp., Portug. from Ar. *bainit*, *bainith*). Any of several species of fishes of the mackerel family. One of these (*Gymnosarda pelamis*) is well known to the sailors as one of the fishes most commonly seen pursuing the flying fishes. It is pelagic and occurs in all tropical seas, coming north to Cape Cod on the coast of America, and is rarely taken in English waters. The back is bluish, belly silvery, with four brownish stripes on each side parallel with the lower curve of the body. It grows to a length of 2½ feet. The alboree (*Sarda sarda*), another species reaching about the same length, occurs on both shores of the north Atlantic. It is a food fish of rather low grade. The California bonito (*Sarda chilensis*) occurs on the west coast of both Americas and in the waters of Japan. It, too, is a poor food fish.

BONITZ, bō-nī'ts', HERMANN (1814-88). A German classical scholar. He was born at Langensalza and studied at the universities of Leipzig and Berlin. In 1836-38 he was an instructor in the Blochmann Institute in Dresden. Subsequently he was a professor in the University of Vienna (1849-67), and from 1867 was director of a gymnasium in Berlin, and member of the Academy of Sciences. While in Vienna he de-

vised, with Exner, a system, in force since 1854, for the reorganization of the Austrian gymnasias. He was deeply versed in the philosophies of both Plato and Aristotle and wrote several expository works, such as *Ueber die Kategorien des Aristoteles* (Vienna, 1853), *Platonische Studien* (Vienna, 1858-60, 3d ed. 1886), and *Aristotelische Studien* (Vienna, 1862-67), *Observationes Criticae*, first on the *Metaphysica* of Aristotle (1842), then on Aristotle's *Magna Moralia* and *Ethica Eudemia* (1844), and edited (Bonn, 1848-49) the *Metaphysica*. He wrote also on Homer, Thucydides, and Sophocles. Consult the biography by Gompertz (Berlin, 1889), in the *Biographisches Jahrbuch für Altertumskunde*.

BON MARCHÉ, bôn mar'shâ'. One of the largest department stores of Paris, noted for its low prices and interesting on account of its successful application of the principles of cooperation. The business is conducted by a board of managers selected from its employees, who receive a share of the profits in addition to salary.

BONN, bôn. A city in the Rhine Province, Prussia, constituting a circle of the Cologne government district and advantageously situated on the left bank of the Rhine, about 15 miles south by east of Cologne. The pleasant villas with their gardens on the river, the fine promenades, the picturesque church towers, and the graceful bridge across the Rhine (completed in 1898), all combine to make Bonn an unusually attractive place. The surroundings also are pleasing and interesting. Of its churches—six Roman Catholic, two Evangelical, an English church (the university chapel), and a synagogue—the imposing Munster is the most important, a notable example of the late Romanesque style. It is a cruciform building of gray stone with two choirs, four small towers, and a great octagonal tower 315 feet high. The church, which dates from the eleventh, twelfth, and thirteenth centuries, was restored in 1875 and the following years and in 1890-94 was adorned with paintings. Among the secular buildings are the Rathaus, with its lofty flight of steps, completed in 1782, the famous Beethoven House, where the composer was born in 1770, now containing the Beethoven Museum, and the buildings of the university for which Bonn is celebrated. The last-named buildings occupy the larger part of the south side of the city.

The Provincial Museum, near the modern railway station, is a handsome building of red sandstone in the Italian Renaissance style. It was erected in 1859-93. It contains a large collection of Roman and mediæval stone monuments and prehistoric antiquities. At the Academic Museum of Art there is a noble collection of casts, among the ancient Greek works are marble Herme, bearing heads of Sophocles, Euripides, Aristophanes, and Menander. In the Poppelsdorfer Schloss are the natural history collections of the university. The Observatory is situated near the Poppelsdorfer Allee—a beautiful avenue shaded with horse-chestnuts. Bonn possesses several interesting monuments, among them a statue of Beethoven, executed by Hanel, a fountain column, in honor of Maximilian Frederick, and a bronze monument to Arndt, who died here in 1860. Bonn has long been a favorite residence of English and other visitors.

Bonn is governed by an over-burgomaster with three salaried assistants, and by 30 councilmen. It has water works, a municipal gas plant, and a volunteer fire department. The city in recent

years has become very prosperous commercially. Besides having an active trade, it manufactures machinery, earthenware, chemicals, jute, pianos and organs, porcelain wares, artificial flowers, faience, cement, and many other articles. Wessel's porcelain and stoneware factory employs 1000 men. It dates from 1755. The city is well provided with railway and river communications and with all the modern conveniences connected with manufacturing and commerce. In the village of Beuel, on the other side of the Rhine, are several important spinning and weaving mills. Bonn is the seat of various educational and industrial organizations. It is well supplied with schools. The university (qv), with its numerous laboratories and institutes, provides all the facilities of a modern seat of higher and professional education. Its several charitable organizations include two orphan homes, two hospitals, and two private insane asylums. In 1900 Bonn had 50,738 inhabitants, in 1910, 87,971.

Bonn, the *Bonna* or *Castra Bonnaensia* of the Romans, is frequently mentioned by Tacitus and was one of the first Roman fortresses on the Rhine. Investigations show that the Castrum here was very extensive. The town was destroyed by the Normans in the ninth century. Having been rebuilt, it acquired some importance when, in 1287, the Archbishop of Cologne transferred his residence and seat of government hither. Two German kings were crowned in its Munster in the fourteenth century. Bonn suffered from its Protestant tendencies and was repeatedly besieged by the Catholics. In 1794 the French marched into the town. They closed its university in 1797, and under their rule, which was recognized by the Treaty of Lunéville in 1801, Bonn's population decreased. It began to revive as soon as the city was recovered by Prussia in 1814, which country reopened the university in 1818.

BONN, UNIVERSITY OF. The second leading Prussian university. It owes its origin to Maximilian Frederick, Archbishop of Cologne, who established an academy here in 1777. Seven years later the Emperor Joseph II made it a university, but it was extinguished by the French invasion. In 1815 the King of Prussia, Frederick William III, decided to establish in the Rhine Province a university as an outpost of German thought and influence. After some contest Bonn was chosen for the site, and in 1818 the university was formally organized. While the archiepiscopal residence remains the central building of the university, many others have been added. In 1912 it had nearly 4000 students, divided among the faculties of evangelical theology, Catholic theology, law, medicine, and philosophy. Its income is over 1,940,000 marks, and its library contains 361,623 volumes, 1042 manuscripts, and 1951 MSS. There are buildings for the medical department, laboratories, a physiological institute, clinics, and an observatory. Among the great names connected with the faculties are those of Arndt, Niebuhr, and A. W. von Schlegel. Bonn has always been a favorite place for the education of Prussian royalty and is socially as well as in scholarship one of the leading German universities, ranking next to that of Berlin, the very greatest Prussian institution for higher learning.

BONNASSIEUX, bôn'a'syê', JEAN (1810-92). A French sculptor. He was born at Pan-

nissières (Loire) and studied first at Lyons under Legendre-Héral, then in the Ecole des Beaux-Arts, Paris, with Dumont, winning the *Prix de Rome* in 1836. His most famous work is a colossal statue of Notre Dame de France, for the town of Le Puy-en-Velay (1860) cast from the bronze of the cannon taken at Sebastopol. Among his works are "Love Clipping his Wings" (1842), in the Luxembourg, and "The Young David" (1844), also bought by the government. For his "Meditation" (1855) he received a medal of the first class and the cross of the Legion of Honor. Commissioned to model a statue of Voltaire for the façade of the Louvre, Bonnat, a firm Catholic, refused, and in its place a statue of Fénelon was erected. This caused him to become a kind of official sculptor to the French clergy, and much of his work was done for the churches of France. Besides his works already named mention should be made of the marble statue of Jeanne Hachette (1848, Luxembourg) and the bronze statues of General d'Andigné (1875, Monnet) and Père Lacordaire (1876, Flavigny).

BONNAT, bon'na', LÉON (JOSEPH FLORENTIN) (1833-). An eminent French portrait and historical painter. He was born in Bayonne, studied with Madrazo in Madrid, where he was much influenced by the works of Velazquez and Ribera, and with Léon Cogniet in Paris. His reputation began with "St. Vincent de Paul Taking the Place of a Galley-Slave" (1860), other religious works are his celebrated "Christ Crucified" (1874, Palais de Justice, Paris), in which he successfully rivals the great realists of the past, Holbein, Ribera, and Velazquez; and "Job" (1880, Luxembourg). Delightful genre subjects like his "Scherzo" attest his skill with Italian folk scenes. But his chief reputation rests upon his portraits, astonishing in their characterization and realism. His sitters included all the presidents of the Third Republic and most of the other celebrities of contemporary France. During the last decade of the nineteenth century he was also the favorite painter of wealthy and distinguished Americans. Among the most celebrated of his portraits are those of Thiers, Victor Hugo, Don Carlos, Léon Cogniet, and Jules Grévy—the last two in the Luxembourg. It is his practice, in producing a portrait, to light the sitter vividly, and to relieve him by the simplest of backgrounds, usually dark. He builds up his figures with the plastic sense of a sculptor; he gives them the projection of life itself. Although lacking in æsthetic charm, they suggest the physical presence of the sitter to a degree almost bordering on deception. He is well represented in American collections, particularly in the Metropolitan Museum, New York, which possesses his portrait of John Taylor Johnson, besides genre subjects. His ambitious mural paintings in the Pantheon, Hôtel de Ville, Palais de Justice, though sound realistic productions, are not successful from the decorative point of view. He was elected to the Institute in 1881, professor in the Ecole des Beaux-Arts in 1888, received the grand cross of the Legion of Honor in 1900, when he was also made Director of the Academy des Beaux-Arts; he is also honorary president of Société des Artistes Français. Consult: Claretie, *Peintres et sculpteurs contemporains* (Paris, 1884); *Modern French Masters*, ed. Van Dyke (New York, 1896); and many numbers of the *Gazette des beaux-arts*.

BONNECHOSE, bôn'shóz', FRANÇOIS PAUL

EMILE BOISNORMAND DE (1801-75). A French author. He was born at Leyerdorp, Holland, entered the French army, served until after the Revolution of 1830, and subsequently was appointed librarian of the Palace of Saint-Cloud. From 1850 to 1853 he was librarian of several of the libraries of the civil list. He published: *Histoire de France* (2 vols., 1834, revised and new ed. by F. M. King in *The History of Nations Series*, 1906); *Les réformateurs avant la réforme* (2 vols., 1844); *Les quatre conquêtes de l'Angleterre* (2 vols., 1851); *Bertrand du Guesclin* (1866), and *Lazare Hoche* (1867).

BONNELLI, ROSE STAHL. See STAHL, ROSE.

BONNER, EDMUND (c.1500-69). Bishop of London. He was born of obscure parentage about 1500. He was educated at Oxford and there admitted doctor of civil law in 1525. The reputation he gained at Oxford by his knowledge of the canon law recommended him to the notice of Wolsey, who made him his chaplain in 1529. After the fall of Wolsey (1530) Bonner took an active share in the endeavor to have Henry VIII divorced and received due promotion from that King. In 1533 he was deputed to appear before Clement VII in Marseilles to appeal for the excommunicated monarch to a general council; but the story that the violence of his threats on this occasion suggested to his Holiness the counter threats of having him burned alive, or thrown into a caldron of melted lead, may be dismissed as fabrications. In 1540 he was made Bishop of London. The death of Henry cooled his Protestant zeal; and having given proofs of his lukewarmness in the cause of Reformation, he was at length, in 1549, in the name of Henry's successor, Edward VI, committed to the Marshalsea and deprived of his bishopric. The accession of Queen Mary restored him to office (1553), and as vicegerent and president of the Convocation, he was the principal agent in the persecution which was carried on against the Reformers during Mary's reign. On the accession of Elizabeth, in 1558, Bonner accompanied his episcopal brethren to salute her at Highgate, but was, on account of his unpopularity, which antedated his career as persecutor, refused the honor of kissing her hand. On May 30, 1559, he was summoned before the Privy Council and there refused, with a consistency worthy of due respect, to take the oath of supremacy. He was accordingly deposed from his bishopric and shut up in the Marshalsea, where he died, Sept. 5, 1569.

BONNER, GERALDINE ("HARD PAN") (1870-). An American author, born on Staten Island, N. Y. She went West when 10 years old and lived in Colorado mining camps and then in San Francisco, where she did her first writing in 1887 for the *Argonaut*. She was dramatic critic and foreign correspondent for this daily. Besides short stories published in *Collier's Weekly*, *Harper's Weekly*, *Harper's Monthly*, and *Lippincott's*, she wrote the novels *Hard Pan* (1900)—she used this title as a pseudonym—*Tomorrow's Tangle* (1902), *The Pioneer* (1905), *The Castlecourt Diamond Case* (1906), and *The Book of Evelyn* (1913), and the plays *Sham* (with Elmer B. Harris, 1908) and *Sauce for the Goose* (with Harry Hutcheson Boyd, 1909).

BONNER, ROBERT (1824-99). An American editor. He was born in Londonderry, Ireland, but while very young emigrated to the United States, learned the trade of a printer,

and in 1839 became a compositor on the *Haitford Courant*. He removed to New York City in 1844 and in 1851 bought the *Ledger*, which soon attained an unprecedented circulation on account of its serial stories and its articles by popular contributors, such as "Fanny Fern" (Mrs James Parton), Edward Everett, Henry Ward Beecher, Longfellow, Tennyson, William Cullen Bryant, Sylvanus Cobb, and Charles Dickens. In 1837 Bonnet handed over the management of the paper to his three sons. He spent more than a half million dollars in purchasing some of the most famous fast trotting horses of his time, including Maud S, Sunol, Dexter, and Rarus.

BON'NET See **SAIL**.

BONNET (OF *bon[n]et*, Fr *bonnet*, from LL *boneta*, from *bon[n]et*, the stuff of which the article was made, possibly Hind *bānūt*, woolen cloth, broadcloth) A covering for the head, distinguished from the *hat* (q v) by being hairless.

Since the distinction between bonnets, hats, and caps has in all periods been to a great extent arbitrary, the history of bonnets is of necessity involved in the history of head-covering in general and that of the cap in particular. Just as the hat is the direct descendant of the roomy *petasos* of the ancient Greeks, with its broad brim for protection from the sun, the bonnet, in its original significance, is a descendant of the *phulos*, the conical, close-fitting cap of the Greek soldier, seaman, and mechanic, as well as of the Roman artisan, which was made of cloth, leather, or felt and resembled the modern fez. It differed from the modern Phrygian bonnet or liberty cap (q v) in not having the top bent or drooping forward. The *mitra* was a tall cap worn by the Persians and the neighboring nations during the Greco-Roman epoch. One form was alluded to as the Phrygian cap. Persons of dignity wore another style, which ended in an ornament and frequently resembled our modern conventional crown. This cap was in general use in western Asia from the time of the Assyrian Empire to the time of the Parthian wars against Rome. In this connection may be mentioned the "bonnets" in Ex. xvix. 9, and Lev. viii. 13, the round mitres worn by ordinary Jewish priests as distinguished from the half-egg-shaped headdress peculiar to the high priests. "Mitre" in Ex. xxviii. 4, and "diadem" in Ezek. xxi. 26, translate the same Hebrew word. A closely related headgear was the tiara-shaped cap worn by priests and married men and women. It is commonly supposed that the bishop's mitre and the tiara of the Pope are derived from the Asiatic headdresses.

The European bonnet of the Middle Ages was of cloth, silk, or velvet, according to the taste of the wearer, and varied greatly in shape at different periods. Among women it frequently took on such grotesque proportions as the *hennin*, worn in the fifteenth century—an absurdly high bonnet mounted on cardboard. In the sixteenth century hats, too, began to be generally worn. The Scotch clung to their old bonnet, celebrated by stories and songs. The braid bonnet of the Lowland peasantry, broad, round, and flat in shape, overshadowing the face and neck, resembled the *bonnet Béarnais* or *béret Basque* of the south of France. It was dark blue in color, except the red tuft on the top. The fabric was of wool, without seam or lining, and exceedingly durable. From having been worn until compara-

tively recent times by small rural proprietors, it gave to the local notabilities the distinctive appellation of "bonnet-lairds." The Highlanders have long worn bonnets of the same fabric, but of different shape. The Balmoral is flat and resembles the Lowland bonnet. The Glengarry rises to a point in front and is without any brim. It was the undress fatigue cap of the British infantry, but has now been superseded by what is known as the "field cap," provided with flaps to cover the ears. See **COSTUME**.

BONNET, *bo-nā'*, ALFRED MAXIMILIEN (1841-) A classical philologist, born in Frankfort-on-the-Main in 1841. He studied at Bonn and became professor of the Latin language and literature at Montpellier. He is the author of *De Claudii Galeni Subfiguratione Empirica* (1872), *Le latin de Gregoire de Tours* (1890), *La philologie classique* (1892), and *Acta Apostolorum Apocrypha* (1891-98).

BONNET, CHARLES (1720-93) A Swiss naturalist and philosopher, born in Geneva. He was educated for the law, but devoted himself to science. A dissertation on aphids, in which is described for the first time parthenogenetic reproduction, procured for him, at the age of 20, the honor of being made corresponding member of the French Academy of Sciences, and in 1743 he was elected a fellow of the Royal Society. In 1745 he published *Traité d'insectologie* and in 1754 *Recherches sur l'usage des feuilles dans les plantes*. Failing eyesight compelled him to abandon investigation, and he devoted himself to philosophical speculation. He wrote *Considérations sur les corps organisés* (1762-68), in which he expounded the theory of *emboîtement*, or the preformation of germs. *Contemplation de la nature* (1764-65), *Palingénésie philosophique, ou idées sur l'état passé et sur l'état des êtres vivants*, *Recherches philosophiques sur les preuves du Christianisme* (1773). Bonnet enjoyed a wide reputation and influence as a naturalist and philosopher, he originated the term "evolution" to apply to the successive unfolding of preformed germs, a meaning quite different from its present one.

BONNET FLUKE, SHARK, etc. See **FLUKE, SHARK** ETC.

BON'NETHEAD' A small shark of the genus *Remicps*, as *Remicps tiburo*, the shovel-head, related to the hammerhead, and frequenting warm seas.

BONNET MONKEY See **MACAQUE**.

BONNET PIECE A gold coin of James V of Scotland, so called on account of the King's head being decorated with a bonnet instead of a crown, as was usual. James V was the first Scottish sovereign who placed dates on his money and the first who diminished the size of the gold coins by "increasing their thickness." The most remarkable are those commonly called the "bonnet pieces," which were struck of native gold. In beauty and elegance of workmanship they approach the Roman coins. These "bonnet pieces" are among the most valued curiosities of the antiquary.

BONNET ROUGE, *bo-nā' rōōzh* The liberty cap of the French Revolution. The name was also transferred to the revolutionists.

BONNEVAL, *bōn'vāl'*, CLAUDE ALEXANDRE, COUNT DE (1675-1747) A French adventurer, also called Achmet Pasha. He was born of a noble family at Coussac, in Limousin, proved unmanageable at the Jesuit college, and was placed in the Royal Marine Corps in his thir-

teenth year. He was transferred to the Guards and served with great distinction in Italy and the Netherlands under Catinat, Villeioi, and Luxembourg, but having behaved with great insolence to the Minister of War, he was condemned to death by a court-martial. He fled to Germany, where, upon the recommendation of Prince Eugene, he obtained employment in the Austrian service. He now bore arms against his native country, was present at the battle of Malplaquet, distinguished himself by many daring exploits, was raised to the rank of lieutenant field marshal, and fought under Prince Eugene in the war between Turkey and Austria, at Peterwardein and Belgrade. At Vienna, after the Peace of Passarowitz, he made himself very disagreeable to the Prince, and was therefore sent in 1723, as master general of ordnance, to the Netherlands, where he soon got into a quarrel with the governor, was brought to trial, and condemned to death. The Emperor commuted the sentence to one year's imprisonment and banishment from German soil. Bonneval went to Constantinople, where he was cordially welcomed, became a Mohammedan, taking the name of Achmet, and was made a pasha of three tails. He was employed in organizing the Turkish artillery and achieved successes as general of a division of 20,000 men in the war of the Porte with Russia. For his services the Sultan appointed him Governor of Chios; but his own imprudence and the envy of others caused his removal from this office. He died in Constantinople. He vainly attempted to stir up the Sultan against Austria. His remarkable energy and great military talents were offset by a boorish and quarrelsome disposition, which always made him enemies on every side. Consult: *Memoirs of the Bashaw Count Bonneval* (London, 1750); Vandal, *Le Pacha Bonneval* (Paris, 1885).

BONNEVILLE, bôn'vil, LAKE. See LAKE BONNEVILLE.

BONNEVILLE, BENJAMIN L. E. (1795-1878). An American army engineer and explorer. He was born in France, emigrated to the United States, and graduated at West Point. In 1820 he was constructing a military road in Mississippi and in 1831 started on an exploring expedition to the Rocky Mountains and was not heard from for several years. He served in the Florida and Mexican wars, rising to the grade of colonel, and in 1861 was retired on account of disability, but served during the Civil War as superintendent of the recruiting service in Missouri, and was raised to the rank of brigadier general in 1865. The extinct Pleistocene lake, in what is now the interior desert basin of northwest Utah, was named for him. Washington Irving edited and amplified the *Adventures of Captain Bonneville, U.S.A., in the Rocky Mountains and the Far West* (2 vols., 1837).

BONNEVILLE, bôn'vel', NICOLAS DE (1760-1828). A French author and publicist, born in Evreux. Upon the outbreak of the Revolution he was appointed an elector and a district president of Paris and deposed, it is said, the idea of the National Guard. He was the founder of a society known as the Cercle Social, from whose press appeared several patriotic journals, such as the *Bouche de Fer*, the *Chronique du Jour*, and the *Bien-Informé*. He was imprisoned as a Girondist in 1793 and also suffered persecution under the Empire for his advanced views.

Among his works are: *Nouveau théâtre allemand* (12 vols., 1782); *Histoire de l'Europe moderne* (1789-92); *Le vieux tribun* (1791); *Nouveau code conjugal établi sur les bases de la constitution* (1792); *Poésies* (1793).

BONNEY, CHARLES CARROLL (1831-1903). An American lawyer, president of the World's Congress Auxiliary of the Columbian Exposition. He was born at Hamilton, N. Y.; studied at Colgate University, and was a teacher in 1848-52. He was admitted to the Illinois bar in 1852 and from 1890 to 1893 was president of the International Law and Order League. He organized and was president of the World's Congress, including the Parliament of Religions, held in connection with the Exposition at Chicago in 1893. Several of his addresses were published, including *Jury Reform* (1882); *The Present Conflict of Capital and Labor* (1886); *The Executive Power and the Enforcement of the Laws* (1890).

BONNEY, THOMAS GEORGE (1833-). An English geologist, born at Rugeley. He studied at St. John's College, Cambridge, where he was tutor from 1868 until 1876. Subsequently he became professor of geology at the University of London. In 1884 he was Hulsean lecturer, and in 1892 Rede lecturer, at Cambridge. He was president of the Geological Society of London in 1884-86, and in 1910-11 was president of the British Association. His publications include *The Alpine Regions* (1868); *Charles Lyell and Modern Geology* (1895); *Ice Work, Past and Present* (1896); *Volcanoes* (1898); *The Mediterranean, its Storied Cities and Venerable Ruins* (1902); *The Work of Rain and Rivers* (1912); *The Building of the Alps* (1912).

BONNIBEL (Fr. *bonne et belle*, good and beautiful). A stock name employed for the heroine in the old pastorals.

BONNIE BLUE FLAG, THE. A popular Confederate song, the authorship of which is disputed. It has been attributed to Henry McCarthy and to Annie C. Ketchum. The song was first given in 1861 at the Varieties Theatre in New Orleans.

BONNIEE, bôn'nyé', GASTON (1853-). A French botanist born in Paris. He studied at the Normal School there and was appointed a professor at the Normal School and subsequently (1887) at the Sorbonne. He founded the laboratory for botanical researches at the Sorbonne and the laboratory for the study of plant ecology at Fontainebleau. The *Revue générale de botanique* is edited by him, and he has published useful manuals: *Les plantes des champs et des bois: excursions botaniques* (1887); *Nouvelle flore des environs de Paris* (1894); *Le monde végétal* (1910); *Flore complète* (1911).

BONNIVARD (also **BONIVARD**), bôné'vâr', FRANÇOIS DE (1496-c.1570). A Swiss patriot, Byron's "Prisoner of Chillon." Educated at Turin, he became in 1510 prior of Saint-Victor, near Geneva, and aided the Genevese against the Duke of Savoy, who captured and imprisoned him for two years. Later he was taken by robbers and offered to the Duke, who imprisoned him from 1530 to 1536 at Chillon. The Genevese and Bernese liberated him. He returned to Geneva, where he was rewarded with a pension and died in honor. His *Chroniques de Genève*, written at municipal request, were published there in 1831 (last ed., 1867). Con-

sult Gribble, *Lake Geneva and its Literary Landmarks* (1901)

BONNYCLABBER An old provincial name for milk that, in the process of souring, has become thick and clotted. The word is a compound of *Ir bannne*, milk, and *ciaba*, thick mud. The word 'clabber' alone is sometimes used in the same sense as the compound.

BONO, **bō'nō**, **BON**, **bōn**, or **BUONO**, **bwō'nō** A family of Venetian architects and sculptors. Its founder, GIOVANNI BONO (1375?-42?), and his son BARTOLOMEO BONO (1400?-42), were the greatest artists of the late Gothic period in Venice, the authors of the famous Palace Ca' d'Oro (1421) and the Porta della Carta (1438), between the Doge's Palace and St Mark's. See **GOthic ARCHITECTURE**.

Another BARTOLOMEO BONO (died 1529), sometimes known as BERGAMASCO, was the designer of the upper part of the Campanile of St Mark's and of the Scuola di San Rocco. He also began the Procuratie Nuove, later completed by Sansovino.

BONOMI, **bō-nō'mé**, GIUSEPPE (1739-1808) An Italian architect, who in 1767 settled in England. He was well known in Italy, having been appointed an architect of St Peter's and in England aided greatly in the revival of Greek architecture. His most celebrated work was a villa erected for the Duke of Argyll at Roseneath, Dumbartonshire. He was elected an associate of the Royal Academy in 1789, and his subsequent failing to obtain election to full membership was the cause of the withdrawal of Reynolds from the presidency. Between 1783 and 1806 he exhibited numerous drawings at the Academy.

BONONCINI, **bō'nōn-chē'né**, or **BUONONCINI**, **bwō'nōn-chē'né**, GIOVANNI BATTISTA (1660?-c 1750) An Italian operatic composer and violinist. He was a pupil of his father, Giovanni Maria Bononcini, and of Paolo Colonna. He became violinist to the court at Vienna in 1691. In 1716 he visited London, where he soon acquired a popularity which made him a formidable rival of Handel, the respective merits of the two musicians being for a time hotly contested. In 1731 it was discovered that he had plagiarized an anthem by Antonio Lotti, and soon afterward he left London in disgrace and went to Paris, where he became interested in alchemy, in the pursuit of which he impoverished himself. He was invited to Vienna in 1742 to compose the festival music in celebration of the Peace of Aix-la-Chapelle. He died in Venice at the age of 90 and is said to have preserved his power of productivity unimpaired to the last. His principal compositions include the operas *Tullo Ostilio* (Rome, 1694), *La fede pubblica* (Vienna, 1699), *Polifemo* (Berlin, 1703), *Asarte* (London, 1720), the *Funeral Anthem for the Duke of Marlborough* (ib, 1722), the oratorio *Il Giosue*, also several symphonies, and some chamber music.

BONONCINI, or **BUONONCINI**, GIOVANNI MARIA (1640-78) An Italian composer. He was born in Modena and studied in Bologna. He early entered the service of the Duke of Modena and became *maestro di cappella* of San Giovanni in Monti. He wrote a great number of instrumental and vocal compositions, and a theoretical work entitled *Musico prathico* (1673).

BONONTA See **BOLOGNA**.

BONPLAND, **bōn'plān'**, AImé JACQUES ALEXANDRE—his real name was Goujard—(1773-

1858) An eminent French botanist. He studied medicine and botany in Paris, and in 1799 accompanied Alexander von Humboldt to America, and with him traveled extensively in Mexico and the Andes (1799-1804), where Bonpland collected 6000 new species of plants. After his return he was appointed director of the gardens at Navarre and Malmaison in 1804, and published several splendid and valuable botanical works, such as *Plantes équinoxiales recueillies au Mexique* (2 vols, 1808-16), *Monographie des Melastomacees* (2 vols, 1806), and *Description des plantes rares cultivees à Navarre et à Malmaison* (1813). He went to Buenos Aires in 1816, with a collection of European plants and fruit trees, and was there appointed professor of natural sciences. In 1821 he undertook an expedition of scientific discovery up the Paraná, with the view of prosecuting his investigations to the Andes, across the Gran Chaco Desert, but Dr Francia, then Dictator of Paraguay, believing him to be a spy, arrested him, and kept him prisoner for eight years. In 1829 Bonpland obtained his liberty, went to Brazil, and resided at Santa Borja till 1850. He then removed to Corrientes, where he practiced medicine till his death. His remarks on the herbarium collected in his travels with Humboldt have been published by Kunth in his *Nova Genera et Species Plantarum* (12 vols, Paris, 1815-25). For his biography, consult Brunel (Paris, 1872).

BON'SAL, STEPHEN (1865-) An American newspaper correspondent, born in Baltimore. He studied at St Paul's School, Concord, N H, and in Heidelberg, Bonn, and Vienna. He was a correspondent for the *New York Herald* in the war between Bulgaria and Servia in 1885, in the Macedonian uprising of 1890, and in the China-Japanese War of 1895, and for the *New York Times* in Mexico in 1910-11. In 1891-96 he was in the American diplomatic service in Peking, Madrid, Tokio, and Korea, and in 1913 he became assistant executive secretary to the Philippine government under the newly appointed governor, F B Harrison. Besides many newspaper and periodical articles he wrote *Morocco as It Is* (1893), *The Real Condition of Cuba To-Day* (1897), a biography of Edward Fitzgerald Beale (1912), *The American Mediterranean* (1912).

BONSTETTEN, **bōn'stēt-en**, CHARLES VICTOR DE (1745-1832) A Swiss author. He was born in Bern and studied in Leyden, Cambridge, and Paris. He was a member of the Grand Council of Bern in 1775 and subsequently bailiff at Saanen and Nyon. He became superior judge at Lugano, but in 1796, to escape the Revolution, withdrew to Italy and thence to Copenhagen, where he remained until 1802, when he removed to Geneva. His works, mostly travels and letters, include *Kleine Schriften* (4 vols, 1799-1801), *Voyage sur la scène des dix derniers livres de l'Énéide* (1805), *Études de l'homme* (1821), *L'homme du Midi et l'homme du Nord* (1824), *Souvenirs écrits en 1831* (1833), *Briefe an Friederike Brun* (2 vols, 1829). For his life, consult Morell (Winterthur, 1861), also, Jenny, *Geschichte der schweizerischen Literatur* (Bern, 1910).

BONTEBOK, **bōn'tē-bōk** One of the hartebeests (*Damaliscus pygargus*), the Dutch name meaning pied goat. See **HARTEBEEST**.

BONTEMPS, **bōn'tān'**, ROGER The pen name used by Roger de Collerye, a jolly Parisian

of the fifteenth century. The name has passed into the language for a "good fellow."

BONTOC-IGOROT, bôn'tók ig'ô-rôt. A powerful head-hunting tribe of Bontoc sub-province, Luzon. They live in compact villages, each one of which is made up of several political and exogamic divisions. Each division is supposed to have separate dormitories for the unmarried men and women. Trial marriage is the rule. Owing to the rough nature of the country and scarcity of game, intensive agriculture is carried on in the mountain-side terraces. Consult A. E. Jenks, "The Bontoc Igorot," *Ethn. Survey Pub.* (Manila, P. I., 1905); Seidenadel, *First Grammar of the Language Spoken by the Bontoc Igorot* (Chicago, 1900).

BON TON, Fr. pron. bôn tôn (Fr. good tone or manner). A comedy by Burgoyne (1760), altered and produced by Garrick (1775) with a subtitle *High Life above Stars*. It was designed as a satire on the introduction of French customs.

BONTOUX, bôn'tou', EUGÈNE (1824-1904). A French financier. He studied at the Ecole Polytechnique and was by profession an engineer, but subsequently was appointed general director of the Southern Railway of Austria. With the support of the Rothschilds he made large speculations. Later, having lost much of his fortune and quarreled with the Rothschilds, he founded in Paris, in 1878, chiefly with the aid of clerical and Legitimist capital, the Union Générale, whose success was marked and extensive. A severe decline in prices in 1882 bankrupted the Union, whose projector escaped five years' imprisonment by flight. He published *L'Union Générale, sa vie, sa mort, son programme* (1888).

BONTUKU, bôn'tou'koo, or BONDUKU. An important commercial town in French Sudan, situated close to the English boundary. It lies at an altitude of nearly 800 feet, on the caravan route connecting Kong and Timbuktu with the western Sudan, and has a large trade in gold dust, salt, and cotton goods. The houses have flat roofs and are inclosed by high clay walls interspersed with buttresses. The architecture suggests a higher state of civilization than is found in the surrounding country. The population is estimated at from 2500 to 3000 and is chiefly immigrant.

BONUS (Lat. *bonus*, good). A special allowance beyond what is formally due. It is applied (a) to a special dividend. If the previous dividend has been 4 per cent on the capital, and if the profits of the current year admit of 5 per cent a formal dividend of that amount might commit the company to a like dividend in future; and to prevent such a precedent, 4 per cent is declared, and a bonus of 1 per cent. It is also used (b) to designate the inducement offered to security holders to part with their securities in exchange for others. Thus, in industrial combinations, it is not infrequent that stockholders of the older corporations receive, in addition to the nominal value of their holdings in the new securities, a bonus, either in cash or in securities of the new organization. The term also designates (c) the payment to the government for the privileges which the act of incorporation confers upon a company.

BONVALOT, bôn'vâ'lô', PIERRE GABRIEL (1853-). A French traveler and explorer. He was born at Epagne (Aube), studied at the lycéum of Troyes, in 1880 accompanied Uffalvy

on a journey of exploration to the interior of Asia, and in 1886-87 accompanied by G. Capus and the painter Pepin, undertook a second journey thither. In 1889-90, with Prince Henri d'Orléans (q.v.), he traversed Asia from Siberia to Tongking. He was sent in 1897 on a government mission to Antoto, Abyssinia. His principal works include: *De Moscou en Bactrane* (1884); *Du Caucase aux Indes à travers le Pamir* (1888); *De Paris au Tonkin à travers le Tibet inconnu* (Eng. trans., 1891, under title *Across Thibet*); *L'Asie inconnue* (1896).

BONVIN, bôn'vân', FRANÇOIS (1817-87). A French genre and still-life painter. He was born at Vaugirad (Seine) and began life as a typesetter. Although his art was self-taught, he achieved an excellent technique, reminding one somewhat of such old masters of genre as De Hoogh, Vermeer, and Chardin (whose successor he claimed to be). His pictures are small in size and represent scenes from popular life—kitchens, workshops, asylums, convents, etc., and less frequently still-life subjects. He is represented in a number of French provincial museums, and in the Luxembourg (Paris) by "The Servant at the Fountain" (1861), "Ave Maria" (1870), and "The Rectory" (1872).

BONY PIKE. A gar pike (*Lepidosteus*). See GAR.

BONZE, bôn'zê. A word corrupted from the Japanese *bōzu*, a Buddhist priest, which in southwestern Japan is nasalized and softened. Correctly applied in general to members of the Buddhist fraternities, by natives, it is used also by foreigners for the priests and monks in other countries of Asia. The term is general, referring to the Buddhist religious members of the community rather than to the rank or priestly character of one who professes the Buddhist religion, the special term for priest being *ōshō* or *so*. Popularly it has especial reference to the shaven head, the old term being also applied to former retainers of the daimios.

BOOBY. Any of various of the lesser and more tropical species of gannets (genus *Sula*). The name is said by Newton (*Dictionary of Birds*, London, 1896, p. 48) to be a corruption of the Portuguese *bobo*, a fool, derived from the Latin *balbus*, stuttering or unarticulate; and to have been "applied, most likely by our [British] seamen, originally, to certain birds from their stupidity in alighting upon ships and allowing themselves to be taken easily by the hand," instances of which have been mentioned in many accounts of early voyages. There is no reason to suppose that these birds are any more stupid than other sea fowl little accustomed to man. Boobies differ from gannets in having the whole lower jaw, chin, and throat naked, but gradations are found, and no hard and fast line can be drawn. Several species are known, one confined to the Peruvian coast, and the others ranging throughout the warmer seas of the whole world and coming north on American shores to Georgia and Lower California. Their habits are those of the gannet (q.v.), with the most important exception that they make their nests, as a rule, on bushes and trees instead of on rocks. The site is always near the seashore. It is a rude platform of sticks and dry seaweed, and contains one or two eggs, "chalk-white superficially, but beneath the calcareous crust pale greenish blue." The commonest and typical species is *Sula sula* or *leucogastra*,

which is dark sooty brown (often tawny), with the naked skin of the face and throat yellowish and the feet dull green. The blue-faced booby (*Sula cyanops*) is white, with wings and tail sooty brown, the naked skin about the face and throat bluish, and the feet reddish. The red-footed booby (*Sula piscator*) is yellowish white, with the wing quills slate colored and the feet red.

BOOBY ISLAND A rock in Torres Strait in lat 10° 38' S and long 141° 53' E, 63 feet in height and one fourth of a mile in diameter. There is a lighthouse on the island, which was formerly used by sealers as a post office. They left letters there to be picked up by passing ships and forwarded on.

BOOG, boog See Bug

BOOK The aim of the first scribes in the choice of the material for their work was to give durable form to the production. Accordingly the earliest inscriptions which have been preserved were placed on stone or baked brick or metal rather than a more flexible but more perishable material. The Ten Commandments, for instance, were graven on slabs of stone. Josephus records that the columns on which the children of Seth placed the records of their inventions were of stone and brick. The Laws of Solon (about 594 B.C.) were inscribed on wooden planks. The earliest productions answering to our modern books of which we have any record were the tiles covered with inscriptions in the soft clay by the Chaldean scribes and rendered permanent by being baked in ovens. The excavations carried on in Lower Mesopotamia (1895-1901) by Dr. John P. Peters and others have brought to light, from the ruins of the Temple of Nippur, tablets believed to have been produced about 6000 B.C. The text inscribed on these is, with few exceptions, devoted to the hymns and invocations used in the temple services. The larger of these Chaldean tablets are flat and measure 9 × 6½ inches, the smaller are slightly convex, and in some cases are not more than 1 inch long, bearing but one or two lines of cuneiform characters. These characters are impressed on the soft clay by a little iron rod (the equivalent of the Roman stylus), not pointed, but triangular, at the end. The impression bears, therefore, the shape of a wedge. In the literature of Egypt the earliest examples (apart from certain inscriptions on the tombs) are copies of what was known as the *Book of the Dead*. The text of this varied with the different copies, as these were prepared for placing in the tombs or in the cases with the mummies, and while all contained invocations to the deities, together with prayers and psalms, differed in including special records, referring to the life of the deceased and to his personal expectations for the world to come. The Chinese speak of their own literature as having originated many thousand years back, but its earliest-known work of which any copies have been preserved dates from 1150 B.C., or some 200 years earlier than the generally accepted date of the Homeric poems. The book in question bears the title *Y-king*, the Book of the Metamorphoses or Developments. The material next in importance to the baked clay, and probably also next in point of antiquity, was the skin of goats. In the earlier form in which this was utilized by the Hebrews, Greeks, and others, the skin was dressed only on one side and did not present any thoroughly finished surface. These dressed skins were

called by the Greeks *diphtherai*, and writings upon them came to be known by the same name. (Ctesias speaks of the *diphtherai basilikai*, royal books) (or writings or documents) of the Persians, and Herodotus says that such skins were used in the earlier ages even in Egypt. It was, however, not until the production of parchment (qv) (*membrana* or *pergamena*), that the value of skins for literary purposes began to be properly understood and even parchment made its way but slowly among writers in competition with the long established papyrus, which it was, however, destined to outlast for many centuries. The name "parchment" (*pergamena*) is derived from the city of Pergamum, where, according to the tradition, it was first prepared under the direction of King Eumenes II, about 190 B.C.

It is probable that parchment had actually been produced considerably before this date, but great impetus was undoubtedly given to its use and its manufacture was improved, owing to the embargo placed by the Egyptian King, Ptolemy Philadelphus, on the exportation from Egypt of papyrus. The papyrus is a species of reed which in ancient times abounded on the banks of the Nile. According to Wilkinson, the plant has now entirely disappeared from Egypt, recalling the prophecy of Isaiah (xix 7) "The paper reeds by the brooks, by the mouth of the brooks, shall wither, be driven away, and be no more." The material used from the papyrus plant was the pith of the stem, which was rolled out into a tissue. Pliny speaks of the layers of the pith being soaked in water of the Nile and woven into a sheet (*plagula* or net). An evidence of the early use, in various countries, of vegetable tissue for writing is found in the etymology of Greek and Latin names for books (*βιβλος*, *liber*, *codex*), all of which refer originally to parts of trees or reeds. The writing on the sheet of papyrus was done with a split reed, for ink, different colored pigments were utilized. The oldest Egyptian papyrus known to have been preserved has been assigned to a date about 2000 B.C., or 4000 years later than the baked tiles of Chaldea. The papyrus book, whether Egyptian, Greek, or Roman, was arranged very much like a modern mounted map. The length of the material, written on one side only, was wound upon a wooden roller. Such rolls were found often 20, 30, or even 40 yards long. Herodotus tells us of a copy of the *Odyssey* written on one such roll. With the increasing scarcity of papyrus, the improved parchment came into general use, superseding papyrus by the beginning of the seventh century. But from the fourth century B.C. to the close of the sixth century A.D., by far the larger proportion of the literature of the world was recorded on sheets of papyrus. The perishability of the papyrus is responsible for the loss of a very large proportion of this literature of antiquity. Bearing in mind the fragile character of the material itself and its liability to destruction through damp, dry rot, mice, and insects, and recalling also that the mere handling of the most careful readers of a papyrus roll destroyed in a very brief period the outside sheets (that is to say, the beginning and the end of the manuscript), one is surprised, not that the literature of Greece and Rome has come to us in such fragmentary condition, but that so many important works have been preserved.

When there came to be as in Rome, in the

first and second centuries A.D., a continued and increasing demand for copies of a work, the booksellers organized methods for speedier multiplication of copies than had been possible when each copy was produced by a single scribe. By using readers who dictated at one time to a group of from 12 to 50 scribes, they secured a very considerable speed in the multiplication of copies. Nearly all of these scribes were slaves, but they were well-educated slaves. Accuracy was, however, sacrificed to speed; there was often no proper collation, and many of the deficiencies in the texts of classical works are to be charged to the carelessness of these copyists. The scribes who prepared the manuscripts were known as *librarii*. This name came afterward to be applied to the booksellers through whom the manifolded copies were sold. The smaller dealers had themselves given the manual labor for the production of their wares; the larger *librarii* hired for the purpose the work of the slaves.

With the institution of the first Christian monasteries, with their *scriptoria* or writing rooms, the business of book making takes on a new phase. The material is parchment. The stylus is developed into a reed pen. The scribes are no longer slaves working under hire, or booksellers preparing copies for sale, but monks manifolded sacred writings for the glory of God. We have thus at once a higher standard of work, both for accuracy and for beauty. The classic texts that exist to-day have come down to us in these parchment copies prepared by the monastic copyists. The texts from which the first of these scribes worked were the papyrus sheets, which shortly thereafter disappeared altogether. Fortunately for the literature of the world, the labor of these earlier generations of monks was not confined exclusively to the duplication of the Scripture or of the sermons of the Fathers. At the instance of Cassiodorus, who in 567 organized in his own monastery at Vivarium the first of these *scriptoria*, a portion of the working time was given to selections of the classics, though the books which were multiplied most frequently were the Scriptures in the Latin version of St. Jerome, St. Augustine's *City of God*, and the *Consolations of Philosophy*, by Boethius. In fact, it was to the monastic scribes that the first printers owed the existence of the classical texts from which their own work was done. See BENEDICTINES.

The next period in the making of books comes with the organization of the oldest universities, Bologna and Paris, all of which date, as far as their effective work is concerned, from the beginning of the thirteenth century. In these universities the making of books became part of the educational work. The bookmakers, i.e., the scribes who had charge of the multiplication of the texts, were appointed by the university authorities. They were held strictly responsible for the accuracy of their manuscripts, which were to be used as texts for the lecturers and for their students. The first scholarly editorial work in the collation and correction of the classic texts dates from this period. The name given to the officials who were charged with the duty of providing texts for the universities was *stationarii*. The work of these men comprised, in addition to the preparation of the texts, the renting at specified rates of the manuscripts so prepared to the students and instructors. During the earlier years of book making

in the universities the sale of manuscripts by the *stationarii* was not permitted.

Paper (q.v.) was introduced into Europe about the beginning of the tenth century. This earliest paper (*charta bomblacina*) was made from cotton. Paper made of linen first came into use, according to Mabillon, in the twelfth century, although Montfaucon asserts that no specimens have been identified earlier than 1270.

According to tradition, the University of Bologna owed its foundation to Charlemagne. This connection is now held to be but a legend. It is true, however, that before the close of the eighth century Charlemagne rendered an important service to the making of books. In 782 the monk Alcuin was called by Charlemagne from his home monastery in York to the court at Tours. Alcuin established a series of royal schools. In these schools was instituted a uniform system of script, which was prescribed for the educational and for the official documents of the realm. Fortunately for the work of the later scribes and for the interests of literature, Alcuin selected for his standard of form not the Gothic, but the Latin script. It was this script of Alcuin's which was accepted as the model for the *scriptoria* of the monasteries, and later for the working rooms of the universities. It was this same script, as developed through the centuries of book writing in the universities, that became the model for the type founders after 1472, who shaped the fonts of the Latin alphabets, i.e., of all the Western alphabets other than the Gothic or German.

It was the practice of the manuscript copyists to place at the close of the text information in regard to the date and place of production, and occasionally, although by no means uniformly, the name of the writer. Such a record at the close of the work is known as "colophon." Even after the introduction of printing we find in a number of books of the last half of the fifteenth century such records presented at the end of the volume in a colophon. It is an inconvenient peculiarity, however, of a large number of the earlier printed books that they fail to present either the name of the printer or the date of their production.

An instance of the price of a manuscript work of the ninth century is given in the life of King Alfred, who bought in 880 from Ceolfried, Bishop of Wearmouth, a work on cosmography, for which he paid in land sufficient to support eight families. It is not safe, however, to deduce an average market value for written books from this or from similar instances of exceptional prices paid for manuscripts. It happened not infrequently that the manuscript contained, in addition to the work of the scribe, designs and illuminations contributed by artists who may have given to this additional labor years of time; and certain manuscripts were inclosed in very elaborate and costly covers. Finally, in case the manuscript happened to be the only copy of that particular text that was within reach, it would possess what might be called a competition value, irrespective of the actual cost of the labor of its production. If the owner forbade any copying, its unique value would remain. We have, therefore, instances through the manuscript period of single works being purchased at exceptional prices, while other works, which called for no less labor on the part of the scribes, could be secured at moderate cost. For additional information in regard to books produced in the manu-

script period, see PALEOGRAPHY, and MANUSCRIPTS, ILLUMINATION OF

With the invention of printing we come to what may be called the modern period of the making of books. The press of Gutenberg was brought to completion in Mainz by the year 1450. For a century prior to this date, books of a special character, made up mainly of pictures with an inconsiderable interpolation of text, had been printed from blocks of solid wood, and later of zinc. These books were chiefly devotional in character. The printing of these block books is termed *xylography*, as contrasted with the printing from movable type, which is classed as *typography*. It is certain that the more important part of Gutenberg's invention was not the mechanism of his press, which differed in detail rather than in principle from the presses previously in use, but the use of movable type. It may be recalled here that movable wooden type had been utilized by the Chinese as early as the beginning of the eleventh century. The first work produced by the movable metal type of Gutenberg was a Latin Bible. Prior to the invention of the printing press, the book had been something with which the scholarly class (chiefly the clerical or ecclesiastical class) alone was concerned. With the distribution of printed copies, first of religious works, then editions of the classics, later writings addressed directly to the understanding of the general public, the book becomes an influence for directing public opinion. It is through the printed sheet that the thought of a Luther or a Calvin becomes a means of revolutionizing the opinions of a large proportion of his generation.

The chief difference in the external appearance of books since the sixteenth century is the general abandonment of the large sizes which were common in the days when books were not supposed to appeal to such a large and varied class as at present. The folio and quarto have almost entirely gone out of use, except for very elaborate and costly books. The technical names of the various sizes are based upon the number of times the old-fashioned large sheet of paper was folded for the binding. The sheet folded once, to make 2 leaves or 4 pages, constitutes a folio, folded into 4 leaves, a quarto, into 8, an octave, into 12, a duodecimo, and so on through the smaller sizes. It is usual to write the Arabic numeral with the Latin termination, as 4to, 8vo, 16mo, etc. The old sizes are not so strictly followed nowadays, though the names are retained for convenience.

Consult Birt, *Das antike Buchwesen in seinem Verhältnis zur Litteratur* (Berlin, 1882); Putnam, *Authors and their Public in Ancient Times* (New York, 1893); Putnam, *Books and their Makers in the Middle Ages* (New York, 1896); Madan, *Books in Manuscript* (London, 1893); Duff, *Early Printed Books* (London, 1893); Pollard, *Early Illustrated Books* (London, 1893), and the authorities referred to under the titles given below. See also PRINTING, BOOKSELLING, BIBLIOGRAPHY, BOOKBINDING, LITERARY PROPERTY.

BOOKBINDING The history of bookbinding is chiefly the history of the ornamentation of book-covers. The mechanical work of sewing and covering a book, described below, might indeed be studied chronologically as regards the changes in the processes employed, but this is of little general interest. The date when strips of vellum were replaced by cords at the back of the

book, though perhaps discoverable, is a less attractive question than that as to the place and time when gold tooling was introduced. Thus in the twelfth century there appear in England the earliest stamped leather bindings, and for our present purpose this is the beginning of the history of the art. The workmen of that time were familiar with the arts of softening leather and then shaping it into the most complicated forms. Under the name of *cur-bouilli*, corrupted in England into quirkboily and the like, the material was used for much of the war equipment of man and horse, as well as for decorative arts in peace. It was therefore easy to take the further step of drawing the soft leather tight on a thin oak board, impressing upon it stamps most commonly of wood and engraved in relief. In this way designs in the taste of the epoch, Romanesque or semi-Byzantine scrolls and conventional birds, are found stamped in leather. In the thirteenth century the design becomes more notably Gothic, in the fourteenth century the emblems of lions, fleurs-de-lis, roses, castles, and all the other devices of heraldry, divide the field with religious emblems. All this is in what is called 'blind' tooling, i.e., in patterns impressed but not colored or gilded.

Gold tooling seems to have come into Europe from the East, probably in the fifteenth century. The custom of coloring the impressed pattern seems to have been introduced about the same time. The art of inlaying was the natural result of this taste for colored patterns and is probably of the sixteenth century. It was for many years chiefly confined to Italy, where it was used with the greatest freedom, the color patterns being partly in inlaid leather, partly in painting, and everywhere bordered and touched with gold.

According to tradition, oak boards were first abandoned in favor of paper by the workmen who covered the books of the famous printer Aldus of Venice in the sixteenth century. Previous to this time even small books had their stiff covers a quarter of an inch thick, and often beveled to a sharp edge to disguise this disproportionate thickness. The "half-binding" of the time was, then, that with leather back, this cover extending not more than an inch over the oak boards, which were otherwise exposed with no decorative effect except the grain in the wood. The cheaper kind of full binding was of brown leather stamped sometimes with separate though not very small tools and with letters put on by separate type, so as to form inscriptions, and sometimes with larger stamps, as where a Christ bearing his cross and a David with his harp are on the two flats of a cover, dated 1568, each stamp measuring $1\frac{1}{2} \times 2\frac{1}{2}$ inches, these and the inscriptions around being gilded in a singular way by a process of lacquering, probably Oriental in its origin. Vellum, parchment, and white pigskin were used, replacing the brown leather, and these light-colored materials were often covered all over with minute patterns, in which apparently metal stamps were freely used.

Jean Grolier de Servières was treasurer of Francis I, King of France, and for him were prepared bindings of great richness and beauty. It appears that the volumes of a library, large for its epoch, were bound for him in this sumptuous way, the characteristic ornamentation being interlacing bands, dark, and edged with gold upon a lighter ground, or scrolls of gold lines only, the name of the book being lettered in the centre

panel of one or both of the sides, and the familiar motto, *Poito meo, domine, in terra viventium*, alternating with or accompanying the phrase, *Io. Grolierii et amicorum*, [the property] of John Grolier and his friends.' The decoration and the friendly legend were both rather closely imitated by Maioli, an Italian, of whom but little is known.

In the seventeenth century the use of coats of arms fully displayed in gold, and occasionally in all the colors of the different bearings, became the most common adornment, though indeed such ornamentation dates from an earlier epoch. The tendency of design in the seventeenth and eighteenth centuries was away from polychromatic efforts and toward insistence upon the beauty of the grained leather set off by the slightly impressed points and lines of gold. It was during the last quarter of the nineteenth century that effects of color, generally procured by means of inlay, were restored to favor.

Metal mountings of all sorts are adjuncts whose principal object is dignity and sumptuousness. When books are very heavy and very precious, clasps have their utility, and bosses, four or five on each side, keep the leather and its ornamentation from being rubbed. Still, however, these mountings, like the far more elaborate covers of wrought silver gilt set with enameled plaques and *cabochon* jewels, are chiefly ornamental in their purpose. Europe has never made so great a use as might have been expected of bindings in rich stuffs beautiful in themselves.

The term "bookbinding" should properly be confined to the process of covering a folded and sewed book by stiff sidepieces of paper, board, or wood, which are secured to the package of folded leaves by flexible strips running across it at the back; which sidepieces are afterward covered by material such as leather of some kind, cloth, or paper, pasted or glued to the stiff sides and to the back. The mounting of a book which is issued in a roll like the Roman *volumen*, or the Japanese scroll of similar character, is hardly bookbinding, although the very delicate use of decorative paper and rich stuffs, and the mounting of the scroll upon a cylindrical roller with ivory or other knobs at the ends, may provide the medium for much decorative treatment; and the modern so-called binding in pasteboard covered by muslin or silk and issued in large quantities by publishers should not be called bookbinding at all. For this the entirely appropriate name "casing" may be used.

In the present art of binding the first process is the folding of the sheets, if the printer has not folded them, or the careful pulling of the book to pieces if it has been bound before. This folding can never be neatly done unless the sheets have been so printed that the letterpress on one side is exactly over that on the opposite side. Sheets of blank paper are added at beginning and end for "end papers" or "fly leaves."

The first page of each sheet of a printed book is usually marked at the bottom with a letter or number (A, B, C, or 1, 2, 3, etc.), technically called the "signature," by which the sheets after folding are arranged in their proper order for sewing. The sheets are then beaten on a smooth stone with a broad-faced hammer and put into a press for several hours, to secure solidity. After thorough "collation," i.e., examination to see that the "signatures" are in regular order, with

all plates and maps, if there be any, in their places and properly mounted on guards, the sheets are ready to be sewed. They are carefully jogged up on the back and top and screwed up tight, back upward, in the lying press. Lines are then drawn across the back to show the sewer the position of the cords or bands on which they are to be sewed. The sewing may be done in the old "flexible" style by sewing on raised cords that stand out from the backs, forming the foundation for the "bands" in finishing; by sawing grooves in the sheets and sewing on the cords let into them; by sewing on tape or parchment instead of the cord; and by whip-stitching in sections, which is necessary for books filled with plates or composed of single leaves, these sections being treated like folded sheets. If the book is to have an open or spring back, grooves are commonly sawed in about one-sixteenth of an inch to take in the cords. This is not first-rate binding; it is far better to let the bands project from the back and let the covering leather adapt itself to these.

After sewing, the book goes to the forwarder, who again jogs it up on back and top and hammers it along the back edge to make it perfectly even. The cords are pulled tight, the first and last signature pasted to its neighbor, and the end papers are attached. The edges are then cut, and the back thoroughly covered with thin hot glue. When this is nearly dry, the back is carefully rounded, the book put in the lying press between backing boards, and the backs of the sections are evenly fanned out, one over the other, from the centre outward, by light blows of a hammer, preserving the round and forming a groove on each side for the cover boards to fit into. These boards are attached by lacing in the frayed-out ends of the cords, called "slips," into holes punched directly opposite the bands. These slips are pasted, and hammered down after lacing in, so as to leave little or no projection. Cover boards are attached also by lacing in tapes, and by introducing the cords or tapes between thin double boards in each cover. These are known as split boards. Headbands are put on to protect the top edge of the binding when the book is tilted by the finger from the shelf. The ideal way of putting on the headbands is to sew the sheets to them as well as to the other bands, and at the same time, rendering them firmer and more secure.

The edges of a cut book may be sprinkled, marbled, gilded, or painted. The most effective gilding is done on the rounded front-edge, over a red stain. Gaufered edges are made by stamping with heated tools on the gilded edges before burnishing. Landscapes are sometimes painted on the sloping surface produced by crowding back the front cover; the edge is then gilt and burnished as usual, the picture becoming visible only when the front cover is pushed back.

The covering of the book is done by simply gluing or pasting the material to be used upon the boards of the sides and upon the back. There is, however, this difference between different kinds of back. Thus, the hollow back, so called, which allows the mass of folded sheets forming the book proper to leave the back and to hinge itself at any point, while the back remains independent and rounded out with an open space between it and the book, is made by putting a piece of stout paper between so that the leather or silk of the cover is glued to it. The "fast back" or "tight back" is made by gluing the cov-

ering directly to the rounded back of the book. As this covering material is added to the completely made book, to the stiff covers and the back after they are put together, it is evident that a great deal of care must be used in stretching it to cover the bands, the corners, and the edge where it is turned under and has its edges covered by the lining paper or *doublure*. This doublure is commonly a piece of marbled or colored and glazed paper, half of which is pasted to the inside of the cover, while the other half forms an additional end paper, but sometimes the cover is lined with a piece of leather or silk.

Finally, the book is ornamented by stamping or tooling. These terms are used generally to imply, in the one case, large plates from which a stamp is taken covering the whole or a large part of the cover at one impression, while tooling is the putting on of the impressed or gilded lines, dots, leaves, and the like, separately, one by one, with a number of tools, the impressions of which are combined together so as to produce the patterns desired. The French term *fer* (iron) is used for one of these tools, hence the phrase *à petits fers*, meaning that the ornamentation is applied by hand, with little tools, one by one, making separate points, short bars, single leaves or flowers, which are combined in patterns. Rollers are used, by means of which indefinitely long lines, zigzags, or simple scroll patterns are applied.

For a still more elaborate adornment, different-colored leathers are combined by "inlaying." Very rarely this is done by a mosaic process of the full thickness of the leather, most commonly the background is lowered or cut away very slightly, and the piece to be inlaid is a mere film. The lines of junction are generally concealed by broader lines of gold, impressed by means of a tool.

When the book is simply to be "cased," as in editions for the trade, the cloth cover, with its board sides and flexible back, is made independently. The sheets of the book having been sewed and backed are then fastened into the case by means of a piece of cheese cloth or loosely woven "super" glued fast to the back of the book, and having projecting side pieces, like hinges, which are pasted to the covers under the end papers.

Casing is made decorative chiefly in two ways—first, by the use of a textile material which is in itself decorative, and secondly, by printing upon the surface of the boards, whether covered with silk or cotton cloth or with paper, a pattern which may be "blind," i. e., merely impressed without color, or in one or several colors. The first method, that by the use of stuff which of itself is ornamental, may be very rich if a brocade is used, and it is noticeable that the large and carefully made books of the Japanese, made to contain water colors, pieces of old drawings, or rare old stuffs and the like, have sometimes for their sole decoration a beautiful piece of brocade for covering material, and sometimes this with the addition of richly worked metal corners. Thirty years of rather constant use, as of a popular book in a reading family, does not seem to injure it except by slightly loosening or "spreading" the back. This, however, is for small books only, those weighing two pounds, or a kilogram, can hardly remain firm more than two or three years. The "decorative bindings" of modern English and especially American popular books are sometimes adorned in a

very effective way either by stamped gold patterns rather deeply impressed upon the cloth sides, or by surface printing without deep incision, which printing may be in one or many colors. It is not hard to combine the two processes. Thus, in one rather pretty book, each cover, about $5\frac{1}{2} \times 8\frac{1}{4}$ inches, has a conventionalized landscape in two dull colors, and above this picture, which occupies two-thirds of the surface, the title, consisting of seven words, is impressed in gold. Some admirable designs are prepared for English publishing houses in which the almost lost art of designing patterns of conventional leafage and the like has been revived. American work runs more often, as in the case mentioned above, towards descriptive and suggestive art, landscapes, emblematic compositions, even figure subjects of some pretension.

Books cased in this way need not be injured for future binding, but they often are, as by the pasting of the edges of inserted plates to the folded sheets of the letterpress, or by sewing the sheets together in such a way that while the same sewing will not be found sufficient for permanent binding, it has still injured the backs for better work. Where "stabbing" of the sheets with tinned wire is done, the book is ruined as a permanent possession.

Bibliography.—HISTORY. Braddington, *History of the Art of Book-binding* (London, 1894). HISTORICAL EXAMPLES. Nelson, *Works on Book-binding from the S. P. Avery Collection* (New York, 1903). TECHNICAL PROCESS. Adam, *Practical Book-binding* (New York, 1903); Battershall, *Book-binding for Bibliophiles* (Greenwich, Conn., 1906); Cockerell, *Book-binding and the Care of Books* (New York, 1912). ALLIED TOPICS. *Journal of the Society of Arts*. Hübner, "Lectures on Paper-Making" (London, Sept. 11, 18, 25, Oct. 2, 1903); *Journal of the Society of Arts*. "Report of the Committee on Leather for Book-binding" (London, July 5, 1901). Westendorf, *Die Kunst der alten Buchbinder* (Halle, 1900). Coutts and Stephen, *Manual of Library Book-binding, Practical and Historical* (London, 1911).

BOOK CLUB. A convenient title for private associations which print books for distribution among a limited circle of subscribers. Such clubs, being usually composed of scholarly men and endowed with sufficient means, have rendered no slight services to literature and learning by rendering accessible a number of valuable works which had existed only in manuscript or in very rare printed copies. "While associations like the Dilettanti Society (q.v.) accomplished some work in publishing, yet books as such were not their primary care. The Roxburghe Club (q.v.), founded in 1812, was the earliest English book club, properly so called, its system imposed on each member the re-printing of one book, and its work was not specially important. The Bannatyne Club, originated by Scott in 1823, was more practical. The Camden Society (1838) began the modern method of publishing by the society instead of leaving it to individual members, it has produced a long series of most useful historical publications. Among many English societies of the kind, the following are especially worthy of note. The Parker Society (1840-55), the Percy Society (1840-52), the Hakluyt Society (1846-), the Early English Text Society (1864-), the Settle of Odd Volumes (1878-), and the Bibliographical Society

(1893-). Other important European book clubs are the Société des Bibliophiles français, the Société des amis des livres, and the Société leonophile de Belgique.

During the Colonial Period in America, and that which immediately followed the Revolution, there were a number of literary associations whose members jointly published their writings, after the fashion of the time, in periodical form. The earliest and most famous of these was the Junto, founded by Benjamin Franklin in 1726. To its efforts the Philadelphia Library (1731), the University of Pennsylvania (1749), and the American Philosophical Society (1768) owe their small beginnings; and it published at different times 10 periodicals of a literary and historical nature, most of which lasted for only a few numbers. The Drone Club, founded in 1792 by Charles Brockden Brown and others, and the Literary Confederacy, formed in 1817 by William Cullen Bryant, Robert C. Sands, James M. Eastburn, and Gulian C. Verplanck, were of the same nature. The first book club in the full sense, however, was the Seventy-six Society, originated in Philadelphia in 1854 by Edward D. Ingraham, stating its object as "the publication and republication of books and papers relating to the American Revolution." It lasted only three years and was immediately succeeded in New York by "The Club," as it was called—it never received any specific name—and two years later by the Bradford Club, an offshoot from the former. In 1858 began the longer career of the Prince Society in Boston, which is still in existence, and has a list of 26 publications, made or in preparation. In the sixties there was a veritable mania for club publication, and absurd ventures were numerous, charging extravagant prices for their subscription books. The revival of club publication dates from about 1876, since when it has been carried forward in a dignified and rational manner. The Historical Printing Club of Brooklyn (1876-1902) was founded by Gordon L. Ford and his sons; it published, chiefly under the editorship of Paul Leicester Ford, over 70 valuable historical documents. But the best known and most important of all is the Grolier Club, founded in New York in 1884 by a number of well-known makers and collectors of books. It has been very successful, not only in its distinctive purpose, but also in drawing together men of scholarly culture in the delightful home which it built for itself in 1889. Its membership was originally limited to 50, but has now been extended to nearly 400. It has published in elaborate and beautiful form more than fifty important literary and bibliographical works, besides catalogues of the valuable exhibitions given by it at frequent intervals. Other American book clubs are the Caxton Club, Chicago; the Bibliophile Society, Boston; the Club of Odd Volumes, Boston; the Rowfant Club, Cleveland; and the Franklin Club, St. Louis. Consult: Hume and Evans, *Learned Societies and Printing Clubs of the United Kingdom* (London, 1853); Growoll, *American Book Clubs* (New York, 1897). Rowfant Club, *Auction Prices of American Book-Club Publications, Compiled by R. F. Roden* (Cleveland, 1904). See GROLIER CLUB.

BOOK COLLECTING. See BIBLIOMANIA.

BOOKKEEPING. The application of the general principles of debit and credit, and of classification of accounts, to the details of busi-

ness. The object of bookkeeping is to furnish a complete and systematic record which may enable the proprietor readily to ascertain any desired facts regarding the progress and condition of his business and his financial relations with others. Without the knowledge thus gained, business cannot safely be carried on, and success or failure is often very closely related to the character of the work done at the bookkeeper's desk. In order that it may meet all the demands which are likely to be made upon it, bookkeeping must be practiced in such a way as to be intelligible, not only to the one who performs the work, but also to others. For if a dispute arises and it becomes necessary to place the books in evidence, suspicion naturally attaches to methods that can be understood and explained only by the interested party. There are two systems of bookkeeping which satisfy the requirements named, and which are accepted and used by practically the entire commercial world. They are known, respectively, as single-entry bookkeeping and double-entry bookkeeping.

Business records of some form or other were doubtless employed in the earliest times in the history of trade and credit. Of the early forms of bookkeeping, however, practically nothing is known. From the works of Leonardo of Pisa it appears certain that the merchants of Italy, France, and Spain practiced systematic bookkeeping for some time prior to the thirteenth century. It is, however, to the Italian traders of the fourteenth and fifteenth centuries, the enterprising merchants of Genoa, Florence, and Venice, that we owe the system of bookkeeping which takes the lead at the present time. In the year 1494 Luca Pacioli, or Luca di Burgo, a Tuscan friar, published a work which contained a treatise upon double-entry bookkeeping. This is the first systematic treatment of the subject of which we have any record. From Italy the system spread to the Netherlands, thence to England, and from there to all parts of the world. And it is worthy of remark that the more complete system of double entry was perfected and brought into general use considerably before the system of single entry.

Double Entry. In double-entry bookkeeping, sometimes called the Italian method on account of its origin, every transaction requires equal entries on both sides of the ledger. The number of entries on the two sides need not correspond, but the amounts must. This representation of every transaction on both sides of the ledger arises from keeping account, not with persons alone, but also with property and allowances. It is this feature which gives the system its name and constitutes its essential characteristic. Property is conceived of as debtor or creditor, according as it has required outlay or has brought in value or discharged indebtedness.

The simplest combination of books suited to double-entry bookkeeping consists of a daybook, journal, and ledger, ruled in accordance with the forms given below. Daybook and journal may be combined to form the daybook journal. The daybook is the one in which are entered the details of each transaction at the time it occurs. This is the original entry and should be made with the greatest care. It is this which must be brought into court in case of legal dispute. In this book, therefore, as in all original entry, erasures should be avoided, and all

changes, for whatever reason made, should be so managed that their nature can readily be determined. In the *journal* are entered the names or titles of the ledger which are to be debited and credited, together with the proper dates and amounts. These are determined from the daybook record, and the process is termed *journalizing*. This is a very important part of the bookkeeper's work and makes the largest demands upon his ability to think correctly. The remainder of his work, with the exception of making out the balance sheet, is to a large extent mechanical. The *ledger* is the book of accounts. From the journal the various items are carried to the ledger, items having the same name or title being gathered together under that title, each on its proper side, debits to debit side, credits to credit side, the left-hand side in this, as in all other books, being debit, and the right credit. The ledger, on account of the classified and summarized nature of its contents, is the business man's principal book of reference. If he wishes to find out how much John Doe owes him, it is to his ledger that he goes for information. Should he wish to pay Richard Roe the balance due him, it is from the ledger he will determine the amount which he must remit. In short, when he desires full, up-to-date information regarding any matter connected with his business, it is generally the ledger which is called into requisition. Towards the perfection of the contents of this book, therefore, all the bookkeeper's work is aimed. The process of carrying the items of the journal to the ledger is termed "posting." In performing this work the careful bookkeeper will follow an invariable order, that the process may be made as nearly mechanical as possible. First, the year should appear in the column at the left on the side to which the item is to be posted, the year need not be entered again until it changes. Next come month, day, explanation, the page of the journal from which the entry is brought, and the amount of the entry. The page of the ledger to which the item has been posted is then immediately entered in the column at the left of the journal, on a line with the item transferred. The last step is taken to leave evidence that the posting has been done.

To open a set of books by double entry, the bookkeeper states in the opening entry of the daybook the kind or name of the business in which the proprietor is to engage. He then enumerates in detail the items which are to constitute his investment, such as cash, real estate, accounts due him, etc., and the debts, if any, which are to be paid out of the business. These two sets of items represent, respectively, his resources and liabilities. The difference between them will be his net investment. When this entry is journalized, each of the items which will make up the resources will be debited, and each of the titles entering into the liabilities will be correspondingly credited, and the proprietor's name or stock will be credited for the net investment, or the difference between the sums of the two. When this journal entry has been posted, the books are properly opened. When the posting for any period has been completed, the debit and credit sides of the ledger should be equal. To determine whether this is the case or not, the *trial balance* is taken—i.e., all the headings of the ledger, excluding those which are in balance or

ruled up, are entered on a suitable sheet, together with the debit and credit footings of each in their proper columns. The two columns are then footed and ought to give equal amounts. If the results are not equal, there is certainly some error which must be found. On the other hand, should the trial balance prove, it would not be certain that no mistakes had been made. For the trial balance will not discover errors of computation, omission of transactions, posting to wrong accounts, etc. The trial balance should be taken, as a rule, at least once a month. The *balance sheet*, which is to be distinguished from the trial balance, involves a classification and analysis of accounts in such a way as to exhibit in detail the resources, liabilities, losses, gains, net gain or loss, and present capital of the business. The balance sheet is of great importance to the business man, and should be made at least once a year, or whenever the business is closed out or otherwise disposed of. It involves the taking of an inventory of all the property on hand, which, in some lines of business, is quite a laborious process. A form of balance sheet is presented below.

When accounts balance, when they become crowded for space, or when they show a loss or gain at the time of making a balance sheet, they are ruled up or closed. The form of closing varies somewhat in accordance with individual taste. The foregoing example of ledger accounts furnishes also an illustration of a simple and convenient form of closing. When red ink is used in the process, it indicates that the entries distinguished by it have been made upon the wrong side of the ledger for the purpose of balancing, and before the work can be regarded as complete, they must be transferred to the opposite side of the ledger, either below the rulings of the account just closed, or below some other heading of the ledger, which is indicated in the red-ink entry.

Aside from the purpose of eliminating from an account the element of loss or gain, or of preventing crowding, an account is closed in order to condense it into a single item, thus simplifying and making intelligible at a glance all the information which the account can give. After a general closing of the ledger it is usually advisable to take off a trial balance of the ledger balances to make sure that all have been correctly transferred, as a mistake in this matter may cause great trouble at the time of the next trial balance.

In the simple combination of books for double-entry bookkeeping, which has been explained, practically all the principles of the system are exemplified. In addition to the books named, however, there are generally found in use one or more such books as the following: cashbook, sales book, invoice book, bill book, order book, check book, inventory book, etc. It is unnecessary to enter upon an explanation of the purpose of these books, it being sufficiently indicated by the name. Of the ways in which they may be combined, there is great variety, every business and every establishment introducing some peculiarities of its own. The general principles, however, are the same in all. They may be used either as principal or auxiliary books. A principal book may be defined as one from which or to which posting is done, an auxiliary book, one kept for convenience of reference, but from which no posting is done. When these books are used purely as auxiliary books, they

do not affect the work in the other books. When, however, they are used as principal books, all entries found in them are omitted from the journal. No account is kept in the ledger of the property with which such books respectively deal; or if kept, only the footings are posted at regular intervals. The latter plan is followed by some in order that a trial balance of the business accounts may be taken without reference to any other book than the ledger. When this is not done, the footings or balances from such books must be properly entered in the trial balance before it can be expected to prove. The ledger titles found on the debit side of these books must be credited in the ledger with the amounts set opposite them and those on the credit side similarly debited. These books are often ruled with special columns for items of frequent occurrence, and when this is done the footings of such columns only are posted to the title which heads the column in accordance with the principle stated below. A form of the cashbook is given below and the method of posting and ruling it is illustrated.

Single Entry. Single-entry bookkeeping, in its pure form, which, however, is rarely used, keeps no account of property. Only personal accounts appear in the ledger, which as a consequence will not be in balance except when the business is closed out. It therefore involves less labor than double entry and, on the other hand, furnishes fewer checks for detecting errors. It is, however, well adapted to some forms of business, and its results are as intelligible and significant as in the more complete system. It fails, of course, to give detailed information in regard to the sources of gain or loss, and this, for some kinds of business, is a fatal objection, for it is this information, clearly set forth by the double-entry balance sheet, which the merchant needs to keep him within the lines of safety and profit.

In single-entry bookkeeping, in its pure form, the only book needed, besides the ledger, is a daybook or journal, in which are made all entries involving debit or credit of persons. The cashbook, sales book, etc., are combined with the books first named as in double entry, but when so used the method becomes no longer pure single entry, but a mixed form. To determine the proprietor's capital at any time, when the books are kept by single entry, an inventory of resources and liabilities is taken, the difference between the totals representing the capital. The loss or gain is found by comparing the present with the former capital. So great is the importance to a concern of its books, and so great the calamity of their loss by theft or fire, that they are usually guarded with great care and kept in a fireproof safe when not in use.

Details. The principles of bookkeeping remain to-day practically as set forth by Luca Pacioli. In details, appliances, and forms, however, there have been many changes. Most of the important changes in the forms of books are of recent date and consist largely in the introduction or extension of the use of special columns. One or two ledger forms which are now in use may be mentioned in this connection. The *centre-ruled ledger*, as it is termed, has the credit amount column arranged alongside of the debit in the centre of the page. It is followed by the *folio column*, the *explanation* and *date columns*, in the order named. The advan-

tages claimed for it are that, being brought close together, comparison of the two columns is made easier, the trial balance can be more readily taken, and in ruling the account no trouble arises because of the rolling of the page. The *card system*, which has become indispensable in so many lines of work, is also being introduced. Large numbers of firms are now using either the detachable or loose-leafed ledger or have adopted the card ledger. The advantages claimed for these forms over the ordinary ledger are the saving in indexing, the removal of dead accounts, escape from the continual transfer of accounts which have become crowded, the elasticity which permits new accounts to be introduced indefinitely, ease of classification, etc.

In no part of the actual practice of bookkeeping has there been a greater advance than in that which deals with the orders sent to the home office by the traveling salesman. Instead of sending these orders, as formerly, illegibly written on any scrap of paper that came to hand, and leaving it for the home office to make the proper entries in the regular sales book, the sales-agent is now furnished with a book with perforated leaves properly ruled and correspond-

BOOKKEEPING FORMS

DAYBOOK			
JANUARY 2, 1914			
Bela M. Wilson began to-day the grain, flour, and feed business with the following investment:			
RESOURCES			
Cash per cashbook	\$5,000 00		
William Jones, note due Jan. 5	300 00		
Joseph Call, on account	400 00		
George Randolph, on account	300 00	\$6,000 00	
LIABILITIES			
Note favor Thomas Wall	200 00		
Charles Johnson, due him on account	550 00		
Nathan Barlow, due him on account	250 00	1,000 00	
Bought of Hanley Bros. on account:			
100 bushels beans . . . @ \$1.50	150 00		
200 " wheat . . . @ .70	140 00		
500 " corn . . . @ .35	175 00		
100 barrels flour . . . @ 4.00	400 00	865 00	
Sold F. E. Thomas, on account:			
2 bushels beans @ \$2.00	4 00		
25 " wheat @ .90	22 50		
1 barrel flour @ 5.00	5 00	31 50	
3			
Gave Hanley Bros. my note at 30 days for \$265.00 on account		265 00	

JOURNAL

JANUARY, 1914			
	2		
Cash	\$5,000 00		
1 Bills Receivable	300 00		
2 Joseph Call	400 00		
3 George Randolph	300 00		
4 To Bills Payable		\$200 00	
5 Charles Johnson		550 00	
6 Nathan Barlow		250 00	
7 Bela M. Wilson		5,000 00	
8	2		
5 Mdse	865 00	865 00	
6 To Hanley Bros.			
7	2		
6 F. E. Thomas	31 50	31 50	
8 To Mdse			
5	2		
8 Hanley Bros	265 00	265 00	
9 To Bills Payable			

LEDGER — Page 5

MERCHANDISE

1914					1914					
Jan	2		J	1	\$865 00	Jan	2	J	1	\$31 50
"	3		J	1	650 00	"	2	J	1	90 00
"	4		J	1	800 00	"	2	C	2	225 00
"	6	Loss and Gain	J	1	110 50	"	3	C	2	170 00
						"	4	C	2	60 00
						"	6	C	2	1,900 00
					2,425 50					2 125 50
Jan	6	Inventory			1,900 00					

The Loss and Gain should be carried to the credit of the Loss and Gain account, on page 7 of the ledger

* Use red ink for these entries and for the rulings

TRIAL BALANCE AND BALANCE SHEET, JANUARY 6, 1914

L F	NAME	DR	CR	LOSSES	GAINS	RESOURCES	LIABILITIES
1	Bela M Wilson	\$15 00	\$5,000 00				
1	Bills Receivable						
2	Joseph Call	400 00	200 00			\$200 00	
2	George Randolph	300 00				300 00	
3	Bills Payable		865 00				\$865 00
4	Charles Johnson	450 00	550 00				100 00
4	N Barlow		250 00				250 00
5	Merchandise	2,315 00	525 50		110 50	1,900 00*	
5	Hanley Brothers	630 00	865 00				
6	F E Thomas	31 50	25 00			6 50	235 00
6	John Hamlin	300 00	1,050 00				750 00
7	Expense	678 00		51 00		625 00	
8	Real Estate	3,500 00				3,500 00*	
C B	Cash Balance	813 00				813 00	
		9,330 50	9,330 50	51 00	110 50	7,244 50	2,200 00
	Wilson's net gain			59 50			
				110 50	110 50		
	Wilson's net investment		4,985 00				
	" not gain		59 50				
	" present capital						5,044 50
						7,244 50	7,244 50

* Entries marked * in Resources column represent inventories, and may be made in red ink to distinguish them

Page 2

FORM OF CASHBOOK (DOUBLE ENTRY)

1914				CASH RECEIPTS			
Jan	2	V	B M Wilson	Investment		\$5,000 00	
"	2	5	Midse	Sold John King		225 00	
"	3	2	Joe Call	On acct		200 00	
"	3	5	Midse	Sold W C Roberts		170 00	
"	4	5	"	" E F Johns		60 00	
"	4	6	F E Thomas	On acct		25 00	
"	4	5	T M Cranston	In full of acct		39 00	
"	5	1	Bills receivable	William Jones's note		300 00	\$6,019 00
							6,019 00
Jan	6		Balance				813 00

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1914				CASH PAYMENTS			
Jan	2	7	Expense	Office Furniture		\$200 00	
"	2	7	"	Safe, H K & Co		250 00	
"	2	7	"	Office books and stationery		20 50	
"	3	4	Chas Johnson	Paid him on account		250 00	
"	3	5	Hanley Bros	On account		365 00	
"	4	1	Bela M Wilson	Drew for private use		15 00	
"	4	6	John Hamlin	On account		300 00	
"	4	7	Expense	Freight bills		93 50	
"	5	7	"	Painting sign		12 00	
"	5	4	Chas Johnson	On account		200 00	
"	5	8	Real Estate	Bought store and lot		3,500 00	\$5,206 00
"	5		Balance				813 00
							6,019 00

All rulings and balancing entries should be made with red ink

ing with a book kept in the office. In this book the agent enters his orders, giving prices, terms, etc., and making extensions and footings complete. The leaves containing the orders are then torn out along the perforated line, sent to the home office, and there by a simple contrivance bound into the book devoted to this particular agent. From this book of original entry, posting is made directly to the ledger. The agent is thus made a part of the working force of the home office, and by the saving thus accomplished the office expenses have been decreased without loss of accuracy or efficiency, and with an actual increase in business.

Expert Work. An expert bookkeeper is sometimes called upon to clear up difficulties brought about by slovenly methods of work or by dishonest practices. It need hardly be remarked that the expert reaches his conclusions not through any mysterious or extraordinary insight, but by systematically taking the original entries and determining whether they have been correctly handled or not. If fraud is present, it may be necessary to correspond with the various firms represented in order to discover to what extent fictitious and fraudulent entries have been made. This takes time, but is entirely simple and makes it impossible to escape from the conclusions to which the method leads. If proper entries were not made or have been lost, the discovery of this will be in some measure accidental, determined through correspondence and settlement with the firms with which the concern in question has had dealings. As in every other department of the bookkeeper's work, so in this, system, care, and attention to details finally secure the result sought.

Consult: Bogle, A.M., *Comprehensive Bookkeeping* (New York, 1905); Lisle, *Accounting in Theory and Practice* (Edinburgh, 1906); Hamilton, *The Principles of Modern Bookkeeping* (London, 1912); Campbell, *Campbell's Actual Accounting* (Indianapolis, 1912); Woolf, *A Short History of Accountants and Accountancy* (London, 1912). See ACCOUNTING, and authorities there referred to.

BOOK LICE. Small, pale, wingless insects of the family Psocidae. To the casual observer they closely resemble plant lice. Some of them are very destructive of books and insect collections, while other forms live in the open on lichens, maple and willow trunks, etc. One of the commonest of the book eaters is *Atropos divinatoria*. The minute pseudoscorpions (Chelifer) sometimes found in old books are called "book scorpions." See BOOKWORM.

BOOK MAKING. The legal offense of keeping a book or record of bets for the purpose of fixing the liability of the losers. The practice is common on race tracks and may also be employed in connection with other gambling transactions, as in "bucket shops," at card games, and the like. The business of a "sporting bookmaker" is not in itself illegal at common law, but it has been made a misdemeanor by statute in New York and other American States.

Consult New York Penal Law, sec. 986. See BETTING; GAMBLING; POOL SELLING.

BOOK OF COMMON ORDER, THE. The name of the Church of Scotland service, evidently suggested by the Book of Common Prayer. Its source was the service of the Genevan English church, and, tentatively adopted in 1562, it came into general use in 1564.

BOOK OF COMMON PRAYER. See PRAYER BOOK.

BOOK OF MARTYRS, THE. One of the most famous books in religious history. Written in Latin, by John Foxe, in 1559, it appeared in his own English translation, under the title of *Actes and Monuments*, in 1563, though from the first popularly called the *Book of Martyrs*. It relates the history of persecution down to about the end of Mary's reign.

BOOK OF MORMON. See MORMON, BOOK OF.
BOOK OF SAINT ALBANS, al'banz. The title of a rhymed book on certain sports wholly or partly written or translated by Dame Juliana Berners and first printed in 1486. It consisted of four parts: "Hawking," "Hunting," "Lynage of Coate Armiris," and "Blasying of Armys." Consult Blades, *Introduction to the Boke of Saint Albans* (London, 1881).

BOOK OF SNOBS. Under this title appeared in 1848 *The Snob Papers*, by Thackeray, a collection of papers contributed to *Punch* (1843).

BOOK OF SPORTS. See SPORTS, BOOK OF.
BOOK OF THE DEAD. See DEAD, BOOK OF THE.

BOOKPLATE. A typographical or pictorial label, used to denote the ownership of a book. Bookplates are considered to have had their origin in Germany; though an unsupported claim has been made that they were used in Japan in the tenth century, and certain small clay tablets are believed to have performed in Babylonia and Assyria an office similar to that of the bookplate of to-day. The earliest printed bookplate we know to-day was used about 1490. It is a hand-colored heraldic design and recorded a gift of books and manuscripts to the Carthusian monastery of Buxheim in Swabia. Until Albrecht Dürer gave his attention to the designing and engraving of bookplates, they were rude woodcuts utterly lacking artistic form. Dürer is sometimes called "the father of bookplates," because under his hand they became works of art. Several undoubted bookplates of his workmanship are known. The earliest of these bearing a date (1516) was the property of Hieronymus Ebner of Nuremberg. Dürer made a bookplate for Bilibald Pirckheimer of the same city which is believed to be earlier than 1503. Among the famous early German artists who engraved bookplates on wood or copper were Lucas Cranach, Hans Holbein, Jost Amman, and Virgil Solis. In the eighteenth century Daniel Chodowiecki engraved several very charming designs. Ever since Dürer put his impress upon them the ornamentation of bookplates has been an important feature, and while their first purpose is to indicate the ownership of the book in which they are pasted or bound, they may, by perfection of design and execution, give pleasure as works of art. Allegory, quotations from the classics, the name of the owner, and his coat of arms are the prominent and customary features.

From Germany the use of the bookplate spread to France, and finally to all continental countries. There is considerable similarity between the early bookplates of Germany and France, but the former are more numerous. The French engravers, as time went on, tended to over-ornament their designs, and the later examples suffer a great loss of dignity for which the delicacy and exquisiteness of their workmanship is no compensation. There are a few very charm-

ing bits by such artists as Collin, Durand, and Eisen.

England was apparently a little slow in adopting the bookplate, as her first ones seem to have been made towards the end of the sixteenth century, but once fairly started, the idea spread rapidly, with the result of making English bookplates outnumber those of all other countries. Up to the beginning of the eighteenth century most English bookplates are in the style known, by the universally accepted nomenclature of Warren, as early armorial. This shows the coat of arms and the name and motto of the owner, with surrounding foliations originally intended to represent the slashed mantle of the helmet. The Jacobean style, extending approximately from 1700 to 1750, is very formal and heavy, its ornamentation resembles carved wood, and the right and left sides of the design usually coincide with precision. About 1750 came in the Chippendale style, so called from the well-known designer and upholsterer of furniture. Light, graceful effects took the place of the sombre designs, fruit and flowers, even pictures of meadows and streams with shepherdesses and swains, were introduced. This was succeeded by the ribbon and wreath style, whose simple, elaste manner well expressed contemporaneous changes of manners and forms. At a date difficult to give, but towards the middle of the eighteenth century, bookmen and engravers began to show more individuality in their bookplate designs, the portrait and the pictorial plate came in, library interiors and many allusions to classical allegory and to the feats of arms or peaceful pleasures of the owners are frequently found, while landscapes and rivers, castles and ruined abbeys contribute to the variety of the pictured scenes. Such names as Hogarth, Marshall, Vernet, Bartolozzi, and Bewick are signed on English bookplates.

The bookplates first used in America were of English make, brought over by the wealthy Colonists. They possess great interest as memorials of the old families, but the plates engraved by the hands of our first American engravers, Nathaniel Hurd and Paul Revere, of Boston, Amos Doolittle, of Connecticut, and Alexander Anderson, of New York (the last of more recent date, but the first to engrave on wood), easily surpass them in value. The earliest date on an American bookplate by an American engraver is 1740, on the Thomas Dering plate engraved by Hurd. There were numerous early engravers through the New England Colonies and States, and in and around New York, Philadelphia, and Baltimore, whose work is highly prized by the collector and student. All of these followed in the main the English styles, though some crude designs, incorrect heraldry, and clumsy engraving mark certain efforts as the work of untrained hands who had no good models to work from. The bookplate of George Washington, though engraved in England, is the most highly valued American bookplate of the early period. The few plates known to be the work of Paul Revere rank next, and high prices have been paid for them.

The present revival of interest in the bookplate dates from the foundation of the Ex Libris Society in 1890. Though the headquarters are in London, the membership is thoroughly cosmopolitan. An illustrated monthly journal is issued to members. France, Germany, and the United States also have societies which issue

publications at stated intervals. All these club journals are of the utmost value and importance to those who wish to keep in touch with the progress of bookplate affairs. The American Book-Plate Society was organized Feb. 1, 1913. Bookplates have become of sufficient importance to be listed by the sellers of old books and to have an occasional catalogue devoted to them entirely. Auction sales of bookplates are not uncommon, and their recognition as interesting items of literary property is widespread. The late Sir Augustus Wollaston Franks, of London, had a collection which is said to have numbered towards 200,000. It is now in the British Museum. The late Dr. Joseph Jackson Howard (who acquired the first collection of bookplates known to have been made) possessed more than 100,000 specimens. Several important collections exist in the United States, notably those of John P. Woodbury, Henry S. Rowe, and Fred J. Libbie, of Boston, W. E. Baillie, of Bridgeport, Conn., Henry Blackwell, and the Grolier Club, of New York, which gave, in 1894, the first public exhibition of bookplates in America. At the present day the black and white reproductions of drawings form the greater number of bookplates, but the copper-plate engraver has found in the renewed interest in these marks of book possession an increasing demand for his art. Among the more notable of recent engravers of bookplates in the United States are Edwin Davis French, Sidney L. Smith, W. F. Hopson, Fred Spenceley, and George W. Eve, of London, who have international reputations as engravers on copper.

Bookplate literature has increased rapidly in the last decade. Very numerous contributions to periodicals and many monographs of permanent interest, but dealing with subdivisions of the subject, have been published. These would swell a complete bibliography to the dimensions of a book. The following list comprises the authoritative works on bookplates: Poulet-Malassie, *Les Ex Libris français* (Paris, 1875), Warren, *A Guide to the Study of Book-Plates* (London, 1880), J. W. Spenceley, *Book-Plates* (Boston, 1905), Carlander, *Svenska Bibloteck och Ex Libris autografer* (Stockholm, 1889), Warnecke, *Die deutschen Bucherzeichen* (Berlin, 1890), Guigard, *Nouvel armorial du bibliophile* (Paris, 1890), Bouchot, *Les Ex Libris et les marques de possession du livre* (Paris, 1891), Castle, *English Book-Plates* (London, 1892), Hamilton, *French Book-Plates* (London, 1892), Hardy, *Book-Plates* (London, 1893), Allen, *American Book-Plates* (New York and London, 1905), Labouchere, *Ladies' Book-Plates* (London and New York, 1895), Hamilton, *Dated Book-Plates* (London, 1896), Fincham, *The Artists and Engravers of British and American Book-Plates* (London, 1897), Count Karl Emich zu Leiningen-Westerburg, *Deutsche und österreichische Bibliothek-Zeichen, Ex Libris* (Stuttgart, 1901), Stone, *Women Designers of Book-Plates* (New York, 1902), *Ex Libris Soc. Journal* (London, 1891-1908), American Book-Plate Society, *The Biblio* (New York, 1913), succeeded by *The Miscellany* (Kansas City, Mo., 1914).

BOOK-SELLING. The earliest history of the production and sale of books is so obscure that little can be added to what is told in the article *Book of the Chaldean tablets of baked clay*, the *Egyptian Book of the Dead*, and other similar productions. We find, however, in Athens, something approaching an organized



BOOKPLATE OF THE GROLIER CLUB

trade in books about the middle of the sixth century B.C. when Pisistratus paid scholars from the municipal treasury for preparing an authorized text of Homer and Hesiod for the use of copyists. Through the Museum of Alexandria and the publishers of Rome, whose work was largely carried on by Greek scribes from Alexandria and Athens, this text has brought down to us the poems of Homer and Hesiod. It is probable that the first regular sales of literature in Athens, and therefore the first in Greece, were carried on by students of philosophy. Diogenes Laertius says that the hearers of Plato interested themselves in the work of circulating the written reports of his lectures, sometimes selling them, but more frequently in the first place lending them out for hire. The facilities for the work of scribes in Athens were evidently, however, during the most important period of Athenian literature, inadequate to supply the demand of the scholars. Books continued to be very costly, and their ownership was limited to the wealthy. Diogenes Laertius is the authority for the statement that Plato paid for three books of Philolaus which Dionysius had secured for him in Sicily, three Attic talents, equal in currency to \$3240, when money was worth much more than it is now. Aristotle says that Gelias paid a similar sum for some few books of Speusippus. Buchl is of the opinion that the order of book trade was carried on in the orchestra of the Athenian theatre, during the time, of course, when no performance was going on.

By the time of Xenophon (about 400 B.C.) Athens was the centre not only of the literary activities of Greece, but of any book trade that existed. The first booksellers prepared with their own labor the scrolls, mainly papyrus, that constituted their stock in trade. The next step in the development of the business was the introduction of the capitalist, who, instead of working with his own hands, employed a staff of copyists and sold the products of their labor. A comedy by Aristophanes refers to a dealer in books. Eupolis speaks, in 430 B.C., of the "place where books are sold," the inference being that a special place in the market was reserved for the book trade. Nicophon, in the next century, gives a list of men who support themselves with the labor of their hands and groups the bookseller with the dealers in food and household utensils. It would appear that the Athenian booksellers derived receipts not only from the sale or from the hire of manuscripts, but from the reading of these aloud in their shops to hearers who paid for the privilege. After the conquest of Greece by the Romans there was a revival in Athens of the trade in books owing to the increased demand from the scholars of Rome, where Greek was accepted as the language of refined literature and its authors were diligently studied.

About 250 B.C. the literary activity encouraged by Ptolemy Philadelphus caused Alexandria to become one of the great book marts of the world. Its first publishing and bookselling were done in connection with the great museum founded by Ptolemy. This comprised in one organization a lending and reference library, a series of art collections, a group of colleges endowed for research, a university for instruction, an academy with functions like those of the French Academy, and a series of workrooms where the scribes prepared from authenticated texts the papyrus manuscripts to be distributed throughout the

civilized world. Ptolemy Soter gave authority to traveling scholars to collect for the museum in Alexandria all the authenticated manuscripts they could find. He is said to have supplied food to the Athenians during a famine only on condition that they would sell to his representatives authenticated copies of the tragedies of Æschylus, Sophocles, and Euripides. For these, in addition to the promised shipment of corn, the sum of 15 talents was paid. Through their enterprise in training numbers of skilled scribes (including now not only educated slaves, but many of the impecunious scholars of the university), and by means of the distributing facilities afforded by the commercial connections of their capital, the Alexandrian publishers retained in their hands for more than two centuries the control of the greater part of the book production of the world. The publishers of Athens disappeared, while those who in the last century B.C. and the first century A.D. were carrying on book businesses in Rome were obliged to have done in Alexandria the work of transcribing such of their issues as were in the Greek language, these forming, until the time of Trajan, a very large portion of their total production. The earlier Roman publisher found it usually to his advantage to send to Alexandria his original texts and to contract with some Alexandrian correspondent who controlled a book-manufacturing establishment for the production of the editions required.

It is in Rome that we find the first records of publishers whose names have been preserved. During the second century B.C. a number of important and costly literary enterprises were undertaken; and the continued production of books addressed to a general public implies the existence of machinery for their distribution. Here, as in Athens, those who first interested themselves in publishing undertakings were men who combined with literary tastes the control of sufficient means to pay for the production of the editions. Their aim was not the securing of profits, but the service of literature and of the state, and these earlier publishing enterprises must frequently have resulted in a deficit. As the size of the editions could easily be limited to the probable demand, and as further copies could always be secured when called for, one would imagine that the expense need not have been considerable. The high prices, however, which under the competition of a literary fashion it became necessary to pay for the educated slaves trained as scribes, constituted a serious item of outlay. Horace speaks of slaves competent to write Greek as costing 8000 sesterces, about \$400. Calvisius, a rich *dilettante*, paid for each of his *servi literati* as much as 10,000 sesterces. In one of the laws of Justinian, in which the relative price of slaves is fixed for the division of estates, *notarii* or scribes are rated 50 per cent higher than artisans.

The man whose name is most intimately connected with the work of publishing in the time of Cicero was his friend Titus Pomponius Atticus, who organized, about 65 B.C., a great book-manufacturing establishment in Rome with connections in Athens and Alexandria. The editions issued by him came to be known as the *Atticiarum*, *Attikiana*, and secured wide repute for their accuracy. Atticus did not confine his book business to his publishing house, but established retail dealers, *tabernarii*, in different

quarters of Rome and also in one or two of the provincial capitals. The publishers of Horace were the brothers Sosii. Their shop was in the *Vicus Tusculus*, near the entrance to the Temple of Janus. It was in a bookshop that Clodius had himself (68 B.C.) from his pursuers. Later we find the stalls of the bibliopoles placed in the most frequented quarters of the city, by the Janus gate of the Forum, by the Temple of Peace, on the Argiletum, in the *Vicus Sandaliarius*, and on the *Sigillaria*. Martial speaks of the street Argiletum as being chiefly occupied by the booksellers, with whom were associated the fashionable tailors. Both Horace and Martial describe the bookshops as places of resort where the more active-minded citizens were in the habit of meeting to look over the literary novelties and to discuss the latest gossip, literary and social.

By the close of the first century the book trade in Rome and in other larger cities of the Empire had developed into large proportions. The packets from Alexandria brought into Rome great cargoes of papyrus from Egypt, which speedily found their way into the workrooms of the publishers. Here a hundred skilled slaves followed with swift pens the rapid dictation of the readers, who from time to time relieved each other. Others occupied themselves with the work of comparison and revision, while a third group covered the completed manuscripts with proper bindings. In the bookshop, *taberna*, collections of the accepted classics and of the latest literary novelties are attractively presented. Here a cheap edition of the *Æneid* for school use is sold for a few pennies, there, great sums are expended for a veritable "original" text of some work by Demosthenes, Thucydides, Cato, or Lucius, while a third buyer is placing a wholesale order for a "proper assortment" of literature to serve as an adornment for a new villa. From the Roman shops large shipments of books were made to other cities, even as far as Gaul. The average editions of works addressed to the general public are estimated by Birt to have comprised from 300 to 1000 copies.

By the time of the accession of Constantine (306 A.D.) the Roman book trade had very much decreased, and with the removal (in 328) of the capital to Byzantium the activities of Rome in connection with general literature came very much to an end. Under the rule of Theodoric the Goth there was, mainly owing to the influence of his minister Cassiodorus, some continued interest in literature, which manifested itself in the preservation and extension of libraries and in the maintenance of the schools. There was, however, during the time of the Gothic rule in Italy, no such demand for books as to render practicable the continued existence of booksellers.

The next bookselling undertakings were carried on from the *scriptoria* of the monasteries. For some centuries, however, the books written in these *scriptoria* were produced for the use only of the monks or of the pupils under their charge. Later there came into vogue a practice of exchanging manuscripts between monasteries, a practice which developed in a measure into a trade in books. There would be in one *scriptorium* a manuscript of special antiquity and authority, from this the scribes would prepare copies which would carry with them a varying value, depending first upon the record (the pedigree, so to speak) of the original manuscript,

and secondly upon the repute that had been secured by that particular *scriptorium* for accurate and scholarly work. See BENEDICTINES.

For centuries the knowledge of reading and writing was so far confined to the clerics that there was no demand for such manuscripts outside of the monasteries. Later, under the influence of such monarchs as Alfred in England, and through the developed interest of certain other princes who had owed their early education to monastery schools, the fashion arose of collecting, in the libraries of kings and nobles, manuscripts containing specimens of the world's literature. Such a taste could advantageously be cultivated by the abbots and their scribes. A nobleman desiring, as a matter of scholarly interest or honorable ambition, to possess a certain manuscript, was willing to pay a high price for it. Not a few of the landed estates connected with the literary monasteries, and more particularly with those of England and Burgundy, were largely secured in exchange for noteworthy manuscripts.

The next important work in the production, exchange, and sale of books was carried on in the universities. The term *stationarius*, which stands for the official bookmakers of the university, first appears in Bologna in 1259 and in Paris some years later, but the work of preparing books for the use of instructors and students had already been carried on for a number of years. In Paris, as in Bologna, the *stationarii* were university officials, and, in the majority of cases, graduates. The conditions of their trade, closely controlled by the regulations of the university, were peculiar. During the thirteenth and part of the fourteenth century the books supplied to the students were not sold, but rented, and the amount of the hire was fixed by university regulation. The *bidells* of the university published from term to term a list of the authoritative university texts which the booksellers were ordered to prepare, to keep in stock, and to hire out. The statutes of the University of Padua of the year 1283 provided that two *stationarii* should be employed. The rental for a term of a fortnight of a *pecia* (a division of from 16 to 32 pages) of the prescribed text was four *denarii*, of the *glossarii* (the commentaries on the text) five *denarii*, and of texts not on the official list six *denarii*. In the year 1289 the list of texts which must be kept in stock in Bologna comprised 117 works. In Padua, as in Bologna, the *stationarii*, in entering upon their business, had to make a deposit of 400 *libra* and go through an examination. Towards the close of the thirteenth century the statutes of Bologna permitted the sale of manuscripts for a commission of 2½ per cent.

The authorities of the University of Paris exercised from the beginning a very complete control over all the details of making, renting, and selling books. Two centuries and a half before the introduction of the printing press the book trade of the university had become in great measure the book trade of the city. The scribes and then masters who were manufacturing manuscripts in the Latin Quarter were not only supplying text-books to the students of the university, but preparing literature for the scholarly readers of France and of Europe. The book dealers of Paris constituted for centuries a guild organized within the university. Its members, the *libraires jurés*, were members of the uni-

versity, and its operations were under the direct control of the academic authorities. It was essential not only to secure for the members of the university, at a fixed and moderate charge, a sufficient supply of correct and complete texts of the prescribed works, but also to protect these students from the contamination of heretical writings or of heretical comments on books of accepted orthodoxy. (See CENSORSHIP.) In the universities of Oxford and Cambridge the *stationarii* began their work some years later than in Paris or Bologna. They had, however, the advantage of freedom from the greater portion of the restrictions which hampered the work of the French and Italian scribes, and their business developed so actively that they soon became the booksellers of the university towns and in large part of the scholarly public of the whole country. It was, of course, from the university term that the name "stationers" came at the outset to be applied to the organized book dealers of Great Britain. The first guild of the British book dealers (the forerunner of the Stationers' Company of 1556) completed its organization in 1403, nearly 60 years before the introduction into England of the printing press.

Outside of the universities an important trade in manuscripts came into being with the close of the fourteenth and beginning of the fifteenth century. The headquarters, not only for Italy, but for Europe, of the trade in Greek manuscripts was for a number of years in Venice, whose close relations with the East gave it an early advantage in connection with this particular class of Eastern products. Among the great manuscript dealers of Italy of the fourteenth century were Auretinus and Vespasiano of Florence, Aurispa of Venice, and Galiotti of Milan. The trade in manuscript books in the Low Countries was distinguished by the beauty of the art work which was associated with the text of the scribes. The manuscripts from Bruges secured, chiefly on this ground, a larger price in the market than is noted for the productions of any other book centre of Europe. The dukes of Burgundy, during the first half of the fifteenth century, were noted for their literary interests and did much to further the book trade of Ghent, Antwerp, and Bruges. The first publishers' guild of the Low Countries was organized in 1424 at Ghent.

The invention of printing (c.1450) revolutionized the methods of bookselling, but the revolution extended over a period of nearly half a century. For years after the first printers began their work in Germany, in France, and in Italy, the production of manuscripts went on, and even as late as the beginning of the fifteenth century certain of the noble book collectors in Italy took the ground that the printed book was for the use of the vulgar reader only, and that the libraries of gentlemen must be devoted exclusively to the manuscript form of literature. Gutenberg's first partner, Fust, and his associate, Schöffer, were the first printers who acted also as publishers and booksellers. Notwithstanding the many difficulties with which they had to contend, they were able to offer their books at prices which to the old dealers in manuscripts seemed so astounding as to give some pretext for the charge of magic. Madden says that a copy of the "forty-eight line Bible," printed on parchment, could be bought in Paris in 1470 for 2000 francs, while the cost of the same text a few years earlier in the manuscript

form would have been five times as great. One of the earlier of the important publishing centres of Europe was Basel. Its most famous name for our purpose is that of Froben, in later years the publisher and friend of Erasmus. The publisher whose work was, between 1475 and 1512, the most important in Germany was Koburger of Nuremberg, who by the year 1500 was utilizing no less than 24 presses and sending out annually more books than any other publisher of his time. He had branches or agencies in Frankfort, Paris, and Lyons, and business correspondence in the Netherlands, Italy, Austria, Hungary, and Poland, as well as throughout Germany. In respect to the bulk of the business done by him and of the commercial success secured, he was a greater publisher than either Aldus or Froben, his two most famous contemporaries. The greatest publisher of this period, however, taking into account not simply the commercial returns of his business, but his influence upon the literature and, one may say, upon the civilization of his time, was Aldus Manutius of Venice. It was to the high scholarly ideals and courageous and unselfish labors of Aldus and his immediate successors, no less than to the imagination, ingenuity, and persistency of Gutenberg and Fust, that the Europe of 1495 was indebted for the great gift of the poetry and of the philosophy of Greece. Mainz and Venice joined hands to place at the service of the scholarly world the literary heritage of Athens. The work of Aldus as a printer publisher (his earlier years had been devoted to teaching) began in the noteworthy year 1492. His first publication was the Greek and Latin grammar of Lascaris. This was followed shortly by the works of Aristotle, a Greek grammar, and a Greek-Latin dictionary. From 1480 to 1500, when the Republic came to be harassed by the war inaugurated by the League of Cambrai, Venice was the most active literature-producing centre in Europe. In the organization of his printing and publishing business Aldus had special obstacles to overcome. A large proportion of his undertakings were issued in Greek; and while he could secure the service of Greek editors, his composers were of necessity Italians. He was obliged, after supervising the founding of the type, to watch typesetting and proof reading. To the text his contributions as an editor were often important. When the book was printed, the copies had to be disposed of by personal correspondence with scholars throughout Europe, to whom the knowledge that Greek classics were obtainable in printed form came but slowly, and with whom grew still more slowly the interest in such classics and the knowledge needed for their study. The delivery of books from Venice to different points of the Continent, particularly during the years of war (and these years were the most numerous), and the securing of the remittances in payment, were by no means easy matters. It is not surprising that Aldus died poor, or that he writes plaintively in 1510 that "for seven years books had had to contend against arms." His most famous editorial associate was Erasmus, for whom also he published the first editions of the famous *Colloquies* and *Praise of Folly*. A serious difficulty with which the books of Aldus had to contend was the competition of the piratical copies of his editions which promptly appeared in Cologne, in Tübingen, in Lyons, and even so close at home as Florence.

In 1589 the guild of the printers, publishers, and booksellers of Milan was organized. The Stationers' Company in England had secured its charter from Queen Mary in 1536, 33 years earlier. Like most of these trade guilds, its object was to restrict the trade to a certain privileged class, the professed aim being "the removal of great and detestable heresies," and the charter ordering "that no man should exercise the mystery of printing, except he was of the stationers' company, or had a license." The guild of the Venetian printers dated from 1548, and was the earliest association of the kind in Europe. The guild of Milan was, however, in certain ways the most important of these earlier organizations. It gave an important incentive to printing and to publishing, it secured a high standard for the quality of the work done, and its regulations tended to keep the business in the hands of a good class of men. The guild of printers and publishers in Paris was a direct development of the earlier guild of manuscript dealers, and, as has been stated, constituted a division of the university. The regulations which had controlled the work of the manuscript dealers, and the supervision and censorship of this work, were continued in France for the productions of the Paris printing presses. The first publishing office in Paris was founded in 1469, at the request of two of the instructors of the Sorbonne, by Gering, Krantz, and Friberger, from Constance, at that time an imperial city of Germany. The work of these bookmakers was carried on in one of the halls of the Sorbonne. Printed books had, however, been sold in Paris seven years earlier. It was in 1462 that Faust brought from Mainz a supply of his folio Bible, copies of which he was able to sell for 50 crowns, while the usual price for manuscript work of this compass had been from 100 to 600 crowns. By the close of the century here were in Paris over 50 printing concerns. After Paris, Lyons was the city of France in which the production of printed books secured the earliest introduction and the most rapid development. The printer publishers of Lyons showed themselves enterprising in more ways than one. They were free from the immediate supervision and control of the authorities of the university of Paris, and, as the history of the Paris press shows, the difficulties placed in the way of publishing undertakings by the bigoted and ignorant censorship of the theologians must have more than offset the advantages usually to be secured in the production of scholarly publications through the facilities of the university and the editorial service rendered by its members. Paris was, however, fortunate in having among its earlier publishers a number of men whose interest in literature was that of scholars as well as of merchants. Gourmont (who established, in 1507, the first Greek press in Paris) and Badius Ascensius had produced before 1530 a long series of important classical works. The printer publishers whose undertakings were, however, of the largest importance for the world of scholarship were the Étienne and the Stephani. They contributed no less than four generations to the publishing business. The work of the Stephani was carried on under exceptional difficulties—commercial, literary, theological, and political. Their books were, with a few exceptions, edited and supervised by the publishers themselves. No publisher except Aldus has ever contributed to the issues of his press as much

original scholarly work as is to be found in the books bearing the imprint of Robert Stephanus Willem Jansoon Blaeu (1571-1638), his sons and grandsons, also deserve honorable mention among the Netherland publishers.

The name of William Caxton holds an honorable place in the early publishing undertakings, not only of England, but of Europe. The list of the books issued from his press was not very great, and the books themselves were much less important for scholarship or for permanent literature than the first publications of certain of the printer publishers of the Continent. The fact, however, that through Caxton printing was introduced into England, and that he was the means of first utilizing for English readers the publishing, training, and scholarly interests which had been developed for him in the Low Countries, gave his work a distinctive importance. Caxton's first printing press was set up in Bruges, and his first seven publications were there issued. The earliest volume printed in Europe in the French language was Caxton's edition of the Burgundian romance *Le Recueil des histoires de Troye*. It was in 1476 that Caxton migrated to Westminster. His list of publications there was largely devoted to romances more or less similar in character to the book first issued from his press in Bruges. The demand at that time in England as indicated by the lists of Caxton and of his immediate successors, for the classical and theological works which constitute so important a portion of the earlier publications of Venice, Paris, Mainz, and Cologne must have been much less considerable than abroad. The period of the beginning of Caxton's publishing business in London was one of political excitement and of civil war, and the times were not favorable for the selling of literature.

A publishing business which, while of no great moment from the commercial point of view, exercised an enormous influence on public opinion in Europe was that instituted in Wittenberg in 1517, at the instance of Luther and Melancthon. Luther's first publisher was Johann Weissenberger, from Nuremberg, who printed a tract by him at Lanschott, in Bavaria, in 1517, and later in the same year the treatise on the Seven Penitential Psalms. Issues of the Lutheran press in Wittenberg followed each other with rapidity. The pamphlets that went out from this press, reprinted in other places by printers who were in sympathy with Luther's work, secured an enormous circulation. It is difficult at this time to understand how, with all the obstacles which existed at that time in making announcement of publications issued, it proved to be possible to bring these pamphlets into the hands of so many thousands of interested readers. The question was also not merely one of making known their existence, but of overcoming the impediments placed by the Church authorities in the way of their distribution. Thousands of copies were sold in the market places, not only by booksellers, but by dealers of all kinds, many of whom had never before handled books. Large supplies were distributed by traveling peddlers among readers out of reach of the bookshops and the market places. These popular tracts met the needs of all classes, educated and uneducated, and secured a wider circulation than had heretofore been achieved by any religious works—or, for that matter, by any writings whatever. Luther

made no profit from these sales. Every gulden that was paid for the books, every pfennig that came in for the fly leaves or pamphlets, was at once expended in further printings and in instituting further distributing machinery.

One of the most noteworthy of the printing houses of the sixteenth century was that established in 1555 by Christopher Plantin in Antwerp. His publications were distinguished not only for the perfection of their typography, but for the beauty of the illustrations, chiefly produced by engraving on copper plates. The books produced in the Low Countries, even during the manuscript period, had always been distinguished by their artistic effectiveness. The illuminations in the manuscripts prepared in Bruges and in Liège were the finest that the world had as yet seen. The same interest in the ornamentation of literature persisted in the Low Countries after the printing press had replaced the work of the *scriptorium*. For a quarter of a century after 1555, Plantin's publishing house was the most considerable in Europe. In 1557 his consignment to the Frankfort Fair comprised no less than 1200 volumes, together with a large assortment of prints from copper plates. The publishing business founded by him continued in the hands of his descendants until 1867 and had thus a continuous existence of nearly three centuries. In 1867 the "plant" was purchased by the city of Antwerp, and the Plantin Museum was instituted.

The Elzevirs of Leyden and Amsterdam, whose work continued during the century between 1587 and 1688, were the most noteworthy publishers of Holland, and the repute of the books issued from the Elzevir Press has continued to the present day. While the fame of Plantin had rested chiefly on his illustrated volumes, the reputation of the Elzevirs was connected more particularly with the classical publications produced by their press. They had the advantage of a community of scholars whose services could be secured at moderate cost for the editing of the long series of classical texts which bear the Elzevir imprint. Their catalogues presented also the names of a number of contemporary writers whose works have achieved an abiding fame, among them Descartes, Galileo, Grotius, Salmasius, Heinsius, Hobbes, Spinoza, and Molière.

The book trade of Germany was first organized by the institution, in 1480, of a division of the Frankfort Fair for the sale of printed books. For many years before this date this fair had been the centre of an active trade in many classes of goods, including not only manuscripts produced in Germany, but also those from the Low Countries, France, and Italy. After 1480 the printer publishers secured an apportionment of space in the buildings assigned for the fair, which was utilized for semiannual gatherings. It was not only the German booksellers who made use of this machinery. The Étienne and the other leading publishers of France, Plantin and his associates of Antwerp, the Elzevirs of Holland, and the leading dealers from Italy, all found it to their advantage to be represented there at least once, and frequently twice, a year. From the beginning of the sixteenth century Leipzig came into importance as a book-producing and bookselling centre, and the rulers of Saxony took an early interest, through the encouragement of the book trade, and through liberal regulations concerning censorship of the

press and a recognition of property rights in the books produced, to further the undertakings of the printer publishers of Saxony.

In the beginning of the bookmaking industry it was understood without further specification that the printer was also the publisher of the works coming from his press. Soon, however, we find associated with his undertakings the names of partners, who had nothing directly to do with the book manufacturing, but who contributed their aid, either for the sake of literary development or for some other motives apart from that of business profit; and in the list of such associates occurred the names of nobles, ecclesiastics, and wealthy scholars. The period of 1650-1764 witnessed the growth of the system of book exchange under which publishers, in disposing of their productions, were obliged to accept in payment the stock of other publishers, so that the market value of books came to be measured in other books. This method, if it did not add very promptly to the receipts of the dealers, had at least the advantage of facilitating the distribution of books and of furthering the organization of the book trade. The first general catalogue of the books offered at the Frankfort Fair was printed in 1564, of the Leipzig Fair, in 1595. Catalogues of individual dealers, however, were published soon after the invention of printing, and more than a score from the fifteenth century are still extant, the oldest of which is that of Johann Mentelin (Strassburg, 1469). The operations and results of the Thirty Years' War (1618-48) had much to do with the transfer of the centre of the book trade from Frankfort to Leipzig, but a large factor in the matter was the increasing intellectual activity of the Protestant states of north Germany, as compared with the southern, which remained under the restrictions imposed by the Catholic authorities. The German publishers and booksellers have all along had the advantage of a more effective organization than that of any other country, under which there has been, with the smallest possible tax on readers, a larger return than elsewhere for the work of writers, and more stable and less speculative conditions for both sellers and purchasers of books. The Leipzig "fairs" are still held annually; after they ceased to be actual occasions for exposing the books for sale, they were long the scene of the settlement of the year's business and are still important reunions of all the publishing interests. Every bookseller in Germany, Austria, and Switzerland has a representative in Leipzig, as the centre of the trade for those countries, and an official organ has been published there since 1834; daily since 1867. Other smaller gatherings similar to the Leipzig Fair occur in Stuttgart, for south Germany, and in Vienna, for Austria-Hungary. While the modern trade is nowhere so elaborately organized as in Germany, all the principal European countries have their associations. In England there are the Associated Booksellers of Great Britain (1874), the London Foreign Booksellers' Association (1895), and the Publishers' Association (1896). Stationers' Hall, in London, is the headquarters of the business, and the *Publishers' Circular* and the *Bookseller* are its recognized organs. The *English Catalogue* has, since 1835, furnished an annual list of all books published in the United Kingdom. The principal French association is the *Cercle de la Librairie*, whose organ is the *Bibliographie de*

la France (1818) Italy has its Associazione Tipografico-libreria Italiana, publishing the *Bibliografia Italiana*

The English book trade was finally released from the earlier restrictions in 1738 and began to develop rapidly. A number of eighteenth-century booksellers have left behind them a reputation for literary as well as business ability. Michael Johnson (1658-1731), father of the great lexicographer, used to travel from town to town with a stock of books which he sold at auction. Andrew Millar (1707-68) was the publisher of Thomson and Fielding and had a large share in Johnson's Dictionary. Dibdin calls Thomas Osborne (fl 1738-67) "the most celebrated bookseller of his day." Some idea of the profits of the business in this period may be gained from the statement which in his old age he used to make with pride, that he had been in business more than 40 years and was worth more than £40,000. That these profits were not always easily made, is recalled by the story of Osborne's being knocked down by Dr Johnson with a folio *Biblia Graeca Septuaginta* (Frankfort, 1594). His name appears on a number of title pages as a shareholder with several other publishers, according to the sociable custom of those days, which gradually died out as the spirit of competition gained ground. A late analogy to this method may be found in the history of the "Friends of Literature," an association of booksellers which existed from 1805 to 1811 and during that time published a number of large editions, which were for the most part divided among the members, though sometimes other booksellers were allowed to hold shares in these undertakings. Bernard Lintot (1674-1735), the publisher of Pope's Homer, and Robert Doddsley (q.v., 1703-64), with his brother James (1724-97), are also conspicuous figures in this era. The novelist Richardson, as a printer, and in 1754 master of the Stationers' Company, has a place here. Charles Rivington (1688-1742) founded the famous house to which he left his name and gave it the somewhat theological character which it long retained. (See also RIVINGTON, JAMES, and consult Rivington, *The Publishing House of Rivington*, London, 1894.) Thomas Longman (see LONGMANS) founded another business, which, like that of the Elsevirs and Stephani, was continued from generation to generation, and a third dynasty was begun by John Murray (q.v., 1778-1843). The great university presses, the Clarendon (q.v.) at Oxford, and the Pitt at Cambridge, have published a vast number of books, largely classical texts, in a uniformly scholarly manner.

There is some controversy as to the placing of the honor of producing the first book published on the American continent. It is asserted that a printer subsidized by Mendoza printed the *Spiritual Ladder* of St John Chrysostom in Mexico in 1532, but a counterclaim is put in for another Mexican publication of seven years later, a *Compendium of Christian Doctrine* in Spanish. A hundred years after the publication of this latter work, we come to the beginning of printing in the English Colonies in America. In 1639 Stephen Daye printed the *Freeman's Oath* and an *Almanack* at Cambridge, Mass., and in the following year appeared the famous Bay Psalm-Book (q.v.), which is now worth more than its weight in gold. This Cambridge Press turned out one book a year for the next 21 years.

Apart from these origins, the history of publishing and bookselling in America may be divided into four periods: (a) the Colonial period; (b) from the Revolution to 1820; (c) from 1820 to 1860; (d) from 1860 to the present time. The selling of books, mostly imported, was usually combined with that of other wares, thus Benedict Arnold sold books and drugs. The early publishers were all primarily printers, and book publishing was merely an incident in their business. Most of them published newspapers, a thorough account of their work is given in North, *History and Present Condition of the Newspaper and Periodical Press of the United States*, a part of the report of the tenth census (Washington, 1884). The second period was the real beginning of the American publishing business in any modern sense. The first book-trade organization was effected through the efforts of Mathew Carey. The principal object was to introduce annual gatherings similar to the Leipzig book fairs. Several such meetings were held, the last one in Elizabethport, N. J., this place being selected for the meeting on account of its central position in the inadequate traveling facilities of the time. These book fairs were succeeded by the "trade sale," held twice a year, first in Philadelphia and later in New York, the heads of publishing houses themselves stood on the platform and sold their books only to members of the trade. The system decayed when people who were not legitimate booksellers gained admission and indulged in reckless underselling and speculation. A final attempt to go back to the "book-fair" arrangement was made in 1877, but it was too late, and the system quietly died out in the eighties. Throughout the second period, whose production Sydney Smith characterized in his famous question, "Who reads an American book?" the greater part of the business done in the United States consisted in the importation of English books, and in the third, probably more than half the titles comprised in the American catalogues were the works of English authors, reprinted usually (in spite of honorable exceptions) without compensation. This period, however, was really the golden age of American publishing and witnessed the foundation of a number of the famous houses. The following dates may be given for the foundation of some of the more famous Methodist Book Concern, 1780, Harper & Brothers, 1817, D Appleton & Co, 1825, John Wiley & Sons, 1828, J B Lippincott & Co, 1835, G P Putnam's Sons, 1838, Little, Brown & Co, 1837, Dodd, Mead & Co, 1839, Charles Scribner's Sons, 1846, Houghton, Mifflin Co, 1849. Stereotyping was introduced into the United States in 1813, and lithography in 1819. These mechanical improvements, together with the gradual development of transportation facilities, gave a great impetus to the American book trade, which, since 1860, has reached enormous proportions. Editions running to several hundred thousand are common at the present time and may be accounted for not only by the immense increase in the numbers of the reading public, but also by the improvements in advertising methods. See ADVERTISING.

Among the later developments the most notable is the formation, in 1901, of the American Publishers' Association and the American Booksellers' Association. Local book organizations have been formed in a number of leading

cities—New York, Philadelphia, Boston, and San Francisco. The most notable of these is the Booksellers' League of New York, which maintains an employment bureau and school for book-store clerks. This latter is the first systematic attempt in America to bring together booksellers' assistants, to give them the benefit of expert knowledge with a view to increasing their usefulness to employers and their worth to themselves.

A large increase in the volume of the English book trade followed upon the foundation of Mudie's Circulating Library, in 1842, its orders frequently amounting to several thousand copies of a single work, and the total number of volumes in it being counted by millions, although the surplus copies of popular books are usually disposed of to smaller libraries when the first demand is over. In this connection it is natural to speak of the practice (common in England throughout the latter half of the nineteenth century and generally abandoned at its close) of publishing nearly all novels originally in three volumes, which largely increased the number of volumes published. The railway bookstall business, conducted for so many years all over England by W. H. Smith & Sons, was another characteristic feature of book distribution in England during the nineteenth century. Statistics show a generally steady increase in the number of works annually published. In 1912 this reached the large total in the United States of 10,135 new books and 768 new editions. Of this total of 10,903, 7975 were books by American authors. In the same year, 1912, in England, the number of books was 9197 and of new editions 2890, a total of 12,067.

Of the immense number of books which have been published since the invention of printing, the vast majority are sooner or later destroyed, many finding their way back again to the paper mill. The buying and selling of out-of-print, old and rare books is a separate branch requiring, to be an expert, a long experience and a wide bibliographical knowledge. Though all old books are rare, not all old books are valuable; in fact, the contrary is the case; most old books are of slight value. Libraries and large collections of old and rare books have been generally offered for sale at auction, and the prices paid at these sales are one of the best guides to the value of out-of-print books. The first book auction, so far as known, was held July 6, 1599, at Leyden. The first book auctioneer in England was William Cooper, who, on Oct. 31, 1676, at nine o'clock in the morning, began the sale of the library of Dr. Lazarus Seaman, vice chancellor of the University of Cambridge.

A *Catalogue of Books to be Sold at Auction*, probably by Benjamin Franklin, was advertised in the *Pennsylvania Gazette* for March 5, 1745, and this is perhaps the earliest record of such sales in America. There are annual records published of the sales of rare and valuable books at auction in England (since 1888) and in the United States (since 1894). In 1905 a compilation containing about 100,000 records selected from various sales, arranged in a single alphabet, was published under the title of *Auction Prices of Books*. Rare books are sought after by the great public libraries, but the rapid increase in price of certain classes of books in recent years has been brought about principally by competition among private collectors. The largest collection of books on the subject of

bookselling may be found in the library of the Bursenverein der Deutschen Buchhändler at Leipzig. The catalogue of this collection, in 2 vols. (vol. i, 1885; vol. ii, 1902), contains several thousand titles in all languages and is an ultimate authority. A very valuable working bibliography on the subject of bookselling has been compiled by William Henry Peet and forms Appendix II, pp. 431-470 of *Mumby's Romance of Bookselling*.

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BOOK-WORM. A name given to the larva or grub of several beetles closely related to the death watch (q.v.). These grubs may feed on the paste, paper, and binding of books. M. Feignot, the French bibliophile, relates that he once found 27 volumes pierced completely through by a single bookworm. Consult *Blades's Enemies of Books*, chap. vi. Books are liable also to be injured by other insects that do not have a grub stage, e.g., the imported cockroach (*Blatta*) called the croton bug, a pest introduced from Europe to the United States; and the book lice (*Psocidae*).

BOO'LAK. See BULAK.

BOOLE, 1801, GEORGE (1815-64). An English mathematician and writer on logic, born in Lincoln. At the age of 16 he became assistant master in a Doncaster private school and subsequently established a school of his own in Lincoln. In 1849 he was made professor of mathematics at Queen's College, Cork, where he died. He is best known, perhaps, for his contributions to logic. His first publication on this subject appeared in 1847, under the title, *Mathematical Analysis of Logic*, and was followed in 1854 by a more extensive work bearing the title *An Investigation of the Laws of Thought on which are Founded the Mathematical Theories of Logic and Probabilities*. The latter work forms a complete exposition of his original method of applying mathematics to

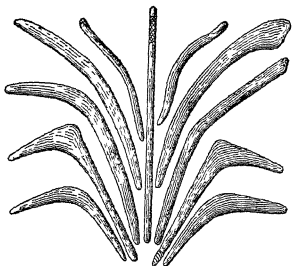
logic According to this method classes of objects and ideas are denoted by mathematical symbols, to which are applied the ordinary rules of algebra, so that the results of logical reasoning may be arrived at by an almost purely mechanical process Much more valuable, however, are Boole's contributions to mathematics The modern theory of invariants may be said to date from a memoir published by him in the *Cambridge Mathematical Journal* in 1841, and he was among the first to contribute to the general theory of covariants His two larger mathematical works, the *Treatise on Differential Equations* (1859) and the *Treatise on the Calculus of Finite Differences* (1860), are standards on their respective subjects His special contributions were published in several scientific periodicals A list of these papers may be found in the Royal Society's *Catalogue of Scientific Memoirs*

BOOM, bōm A town in the province of Antwerp, Belgium, about 10 miles south of the city of Antwerp (Map Belgium, C 3) Its situation at the junction of the Brussels Canal with the river Rupel makes it a place of considerable commercial importance It has numerous and extensive brick and tile works, breweries, tanneries, shipbuilding yards, rope works, sail-cloth manufactures, salt works, etc A suspension bridge, 800 feet long, is a feature Pop., 1890, 14,100, 1900, 15,863, 1910, 17,481

BOOM (Dutch *boom*, Ger *Baum*, tree, beam) A long pole or spar used to extend the foot of certain sails of a ship, as the *main boom*, *jib boom*, *studding-sail boom* Some of the booms are stationary, others are pivoted at one end, the other end being controlled by guys or sheets, and others, like the studding-sail booms which are only occasionally used, rig in and out by means of tackles The space in the waist of a vessel of old type used for stowing boats and spare spars is called the *booms* To *boom off* a vessel or boat is to shove it away with spars The term "boom" is applied also to a chain of floating logs fastened together at the ends and stretched across a river, etc, to stop floating timber Hence the name is adopted in military usage to denote a strong barrier, as of beams, or an iron chain or cable fastened to spars, extended across a river or the mouth of a harbor to prevent an enemy's ships from passing Such a boom should be protected by a battery or batteries, and the approaches thickly planted with submarine mines It is considered best to have booms made double, one to stop the way of ships that have penetrated the first. A chain for this purpose was stretched across the Hudson River at West Point during the American Revolution The Russians effectually closed the harbor of Sebastopol with a boom defense in 1854, thereby preventing the entrance of the English and French ships This was done partly by sinking some of their own ships and partly by the laying of booms Some of the most gallant and daring pieces of work that have been done by seamen have been in connection with blowing up or cutting away booms in order to make a free passage for the vessels of the fleet During the American Civil War, when Farragut's fleet attacked New Orleans, formidable chains stretched across the river and, buoyed up by hulks, were first encountered and destroyed The torpedo netting of steel wire or rings used to protect a ship from torpedoes which may be discharged towards it is held

suspended 20 or more feet from the ship by means of a series of linged booms

BOOMERANG (native name in New South Wales, *bumarin*, *woomurung*, among the designations for a club) A curved missile of the Australians made of the green wood of the acacia or some other hard tree treated with fire The



BOOMERANGS AND BOOMERANG-SHAPED CLUBS
(In the British and Berlin Museums)

boomerang averages $2\frac{1}{2}$ feet in length and $2\frac{1}{2}$ inches in width, is convex on one side and flat on the other, with a sharp edge along the curve convex When thrown with a certain movement of the hand (the grasping end is marked by incised lines, etc.), flat side down, convex side forward, this weapon will, after traveling some distance return in a sort of ellipse almost to the feet of the thrower, who is also able to vary its course considerably In Australia the shape, use, and power of the boomerang vary greatly—it ranges all the way from a mere toy to a large and powerful war weapon It is sometimes ornamented in simple fashion Boomerang-like objects are claimed by some to have existed in ancient Assyria, Egypt, and elsewhere far outside of the Australian area, and Schoetensack (1901) has even claimed certain bone objects belonging to prehistoric man in western Europe as boomerangs, but all this remains to be proved Of late years the boomerang has been the subject of mathematical and physical experimentation, and an excellent paper by Mr G T Walker, "On Boomerangs," is to be found in the *Philosophical Transactions of the Royal Society* (London, 1897) Consult also Sarg's *Die australischen Bumerang im städtischen Volkmuseum* (Frankfurt, 1911)

BOOMSLANGE, boom'slange (Dutch *boom*, tree + *slang*, Ger *Schlange*, snake) A beautiful South African tree snake (*Bucephalus capensis*), so variable that it has furnished several supposed species to zoology, and regarded as poisonous, though possessing no venom glands

BOONE A city and the county seat of Boone Co., Iowa, 43 miles north by west of Des Moines, on the Chicago and Northwestern, the Chicago, Milwaukee, and St Paul, and the Fort Dodge, Des Moines, and Southern railroads (Map Iowa, D 2) Noteworthy features include the high school building, the Eastern Star Home (Masonic), the public library, Swedish National Old People's Home, Biblical College, Orphans' Home, Armory, the Boone Viaduct, and the hospital The region abounds in coal

and clay, and the city has an extensive trade in coal, grain, agricultural produce, and live stock. Industrial establishments include brick and tile works, machine shops, nickel-plating works, foundries, cement tile machines, carriage and plow works, and glove, saddlery, hosiery, medicine, soap, hair tonic, broom, and wire-fence factories; and extensive shops of the Chicago and Northwestern and the Fort Dodge, Des Moines, and Southern railroads. The water works are owned by the municipality. Pop., 1910, 10,347.

BOONE, DANIEL (1735-1820). A famous backwoodsman and pioneer. He was born in Bucks Co., Pa. About 1752 his family moved to Holman's Ford, on the Yadkin, in North Carolina, where Daniel Boone became remarkably proficient as a hunter and trapper, and, for a time, attended school. He soon became restive under the restraints of civilized society and, fired by the tales of John Finley, a trapper who had visited the Kentucky River in 1752, entered the wilderness with five companions and spent two years (1769-71) roaming through the unknown forests. His companions were soon captured or killed by the Indians, and he himself, together with a brother who had joined him in January, 1770, had many narrow escapes. In 1773 he started for eastern Kentucky with five families besides his own, but was forced to turn back by an Indian attack, and in 1774 served on the frontier during Lord Dunmore's War. In 1775, as agent of a North Carolina company, he built a fort on the site of the present Boonesboro, Ky., whither, soon afterward, he brought his family. This fort was twice attacked, in 1777, by a large force of Indians, who, however, failed to capture it. Early in 1778 Boone led a party of 30 to the Lower Blue Licks on the Licking River to secure a supply of salt. Here, February 7, he was captured by a band of Indians, who, after taking him to Detroit, finally adopted him and allowed him such freedom that he managed to escape (June 16) and reached the fort at Boonesboro five days later, in time to help defend it (August 8) against an Indian attack. (See **BOONESBORO**.) He then went to North Carolina, but in 1780 returned and in 1782 took a prominent part in the "Battle of Blue Licks." He lost his Kentucky land through defective titles and moved, about 1790, to the Kanawha River, near Point Pleasant, Va. (now W. Va.), where he lived until 1795, when he again moved, this time to the Femme Osage settlement, in Spanish territory, about 45 miles west of St. Louis. From 1800 to 1804, under a commission from the Spanish authorities, he was commandant of the Femme Osage district. After the purchase of Louisiana by the United States he was again involved in litigation and ultimately lost nearly all his Missouri land. He died Sept. 26, 1820, and was buried in Missouri, but in 1845 his remains, with those of his wife, were reinterred at Frankfort, Ky. Boone has come to be regarded as the typical pioneer. He was bold and venturesome, insensible to fear, remarkably skilled in woodcraft, a fine marksman, and a successful trapper. Personally he was mild-mannered, quiet, and unassuming. An account of his life, based on his own relation, was written by Filson in 1784. This so-called *Autobiography*, which is inaccurate, increased his fame as a hunter and fighter. But his services have in all probability been greatly overestimated. He was neither the first to explore nor the first to settle the Kentucky region. The latest and

best biography of Boone is that by R. G. Thwaites (New York, 1902). Consult also Sparks's *American Biography* (New York, 1856).

BOONE, WILLIAM JONES (1811-64). An American clergyman, first missionary bishop to China of the Protestant Episcopal church. He was born at Walterborough, S. C., graduated at the College of South Carolina in 1829, was admitted to the bar, but relinquished law, and in 1837 was ordained priest of the Protestant Episcopal church. In 1844 he was consecrated missionary bishop. He was a profound scholar in the Chinese language and literature, translated the Prayer Book, and was prominent in the revision of the Chinese scriptures.

BOONESBORO, böönz'bur'ö. A village in Madison Co., Ky., on the Kentucky River, about 18 miles southeast of Lexington (Map: Kentucky, G 2). In 1775 Daniel Boone built his first fort here, and later in the year a land office was opened and the first legislature which ever assembled beyond the Alleghenies met here. In April and July, 1777, and in August, 1778, the fort was unsuccessfully attacked by the Indians. Consult Ranck, *Boonesborough, a Pioneer Town of Kentucky* (Louisville, Ky., 1901).

BOONTON, böön'ton. A town in Morris Co., N. J., 30 miles northwest of New York City, on the Rockaway River, the Morris Canal, and the Lackawanna Railroad (Map: New Jersey, D 2). It is picturesquely situated among high hills and is popular as a suburban place of residence and a summer resort. The town has important manufactures of storage batteries, hats, bronze, paper, silk, and rubber. The Jersey City water works, forming a large lake three miles long by a mile or more in width, are located here, and the town contains a public library, a lyceum, an opera house, and fine natural falls. Boonton was started by the establishment of a large factory, in 1831, by the New Jersey Iron Company. In Old Boonton, one mile distant, first settled about 1700, one of the first iron works and the first slitting mill in America were built, the latter in 1770. Pop., 1900, 3901; 1910, 4930.

BOONVILLE. A city and the county seat of Warrick Co., Ind., 17 miles east by north of Evansville, on the Southern Railway (Map: Indiana, B 4). It is the centre of an agricultural region, and contains some timber and valuable deposits of bituminous coal and fire and pottery clay. Boonville manufactures snuff and smoking tobacco extensively and has flour mills. The water works are owned by the municipality. Pop., 1890, 1881; 1900, 2849; 1910, 3934.

BOONVILLE. A city and the county seat of Cooper Co., Mo., about 41 miles northwest of Jefferson City on the Missouri River, here crossed by a fine railroad bridge, and on the Missouri Pacific and the Missouri, Kansas, and Texas railroads (Map: Missouri, D 3). It has an important river commerce, and manufactures soda water, flour, brick, pottery, carriages, pipes, harrows, etc. The city has some reputation as a summer resort. It is the seat of the State Training School for Boys and Kemper Military School, contains Harley Park, comprising 35 acres, and a fine county courthouse. The water works are owned by the city. Founded in 1818, Boonville was incorporated in 1839, and is now governed under a charter of 1896, which provides for a mayor, elected every two years, and a city council. Here, on June 17, 1861, the Union

General Lyon, with 2000 men, defeated the Confederates under Maimaduke, commanding a somewhat larger force of ill-organized volunteers. Boonville is situated on the National Ocean to Ocean Highway. It is the place where this road crosses the Missouri River and is the end of the old Boon's Luck Trail and the beginning of the Santa Fe Trail. Pop., 1890, 4141, 1900, 4377, 1910, 4352.

BOORDE, **BERD**, **ANDREW** (c1490-1549). An English traveler and physician, born near Cuckfield. He was educated at Oxford and was early received into the order of Carthusian monks at the London Charterhouse. Disliking this rigid life, he went over to France, about 1528, to study medicine. He traveled extensively, visiting the leading universities and eventually reaching the Holy Land. His works comprise mainly the *Introduction of Knowledge* (c1547), said to be the first printed handbook of Europe, and to contain the first printed specimens of the Gypsy language, the *Dyciary* (c1542), *Breuiary of Health* (1547), *Book of Beards* (lost), and *Itinerary of England* (1735). He also issued prognostications, or almanacs. He was known as a wit and merry fellow, and for this reason he had fathered upon him the famous *Scagins Jestis*. Consult ed FURNIVALL (for Early English Text Society), *The Introduction*, and *Dyciary* (London, 1870).

BOO'SA. See **BUSSANG**.

BOOSTER. See **DYNAMO-ELECTRIC MACHINERY**.

BOOT. A lengthened variety of shoe, which is among the most ancient articles of attire. Shoes, extending a certain height up the leg, laced, ornamented, and of fanciful colors, were in use by the ancient Egyptians, Greeks, and Romans. A description of these and other varieties of shoes, as well as an account of the trade and manufacture of shoes and boots generally, will be found in the article **SHOES**, and below will be given a few historical particulars respecting what properly are called boots, in the sense of leather coverings for both the legs and feet. Different kinds of half-boots were worn by the Anglo-Saxons and Anglo-Normans, and in the reign of Edward IV, if not earlier, the boot proper, with tops and spurs, was established as an article of knightly dress. In the reign of Charles I a species of boot, exceedingly wide at the top, made of Spanish leather, came into use, and with Charles II the highly decorated French boot was introduced as an article of court attire. Meanwhile the jack boot, as it is called, had become indispensable in the costume of cavalry soldiers and horsemen generally, and it was regularly adopted in England by William III and his followers. Strongly made, the jack boot extended in length above the knee, was wide at the top, had a very high heel, and around the ankle had a flat leather band, by which a powerful spur was attached.

The jack boot, a form of which is still used in the British Horse Guards and other European cavalry regiments, is almost entitled to be called the parent of the top-boot and other more or less similar styles. Boots with tops of yellow were so commonly worn by English gentlemen in the eighteenth century as to become a peculiarity in the national costume. When Philip, Duke of Orleans, and other revolutionists of note affected to imitate English sentiments and manners, they ostentatiously wore

top-boots. Early in the nineteenth century top-boots were habitually worn by English gentlemen, but at the present time they characterize the apparel of coachmen, grooms, jockeys, and cross-country riders. The introduction of the Hessian boot as an article of walking dress tended to break up the general use of top-boots, and, worn over tight trousers, it had an attractive and ornamental appearance. Boots of this shape, as may be seen from engravings, were worn by English general officers in the early part of the Napoleonic wars and somewhat later. At length they were superseded by the well-known Wellington boot, which, as its name signifies, was introduced by the great Duke to be worn under the loose military trousers. This species of boot has, in its turn, been almost entirely abandoned in consequence of the universal use of short ankle boots or shoes. Boots are worn by cavalry and horsemen generally, though in many instances leather leggins known as puttees are preferred. Boots are often to be seen in the rural districts of America and Europe. They may be made of rubber and cloth and in such form are used extensively by men working in water or damp places, while boots of wool or felt are found useful under certain conditions.

The word "boot" is also used to indicate a leather flap fastened to the front or dashboard of a carriage to be drawn up over the lap of the rider as a protection from the rain. See **SHOES** AND **SHOE MANUFACTURE**.

BOOT, BOOTS, or BOOT'IKIN. A Scottish instrument of judicial torture, formerly used to force confessions from persons accused of crimes, or answers from unwilling or suspected witnesses. Bishop Burnet, in the *History of his own Time*, and Sir Walter Scott, in his *Old Mortality*, speak of the boot as made of iron, but the Rev. Thomas Mozer, in his *Short Account of Scotland*, written from personal observation of the country at a time when the boot was still in use, describes it as "made of four pieces of narrow boards nailed together, of a competent length for the leg, not unlike those short cases we use to guard young trees from the rabbits." One or both legs of the person to be tortured having been placed in this case, wedges were inserted between the limb and the sides of the case, and these wedges were driven down by the executioner with a mallet or hammer, questions being at intervals put to the sufferer, until either he gave the desired information, or fainted away, or showed such endurance as satisfied the judges that no answer could be extorted from him. The wedges were commonly placed against the calf of the leg, but Bishop Burnet says he had heard that they were sometimes placed against the shin bone. When the boot was first used is unknown. After 1630 it is said to have fallen into disuse for about 30 years. It was revived after the insurrection of the Westland Covenanters in 1666, and continued to be used throughout the reigns of Charles II, James II, and during the first years of William III. In 1690 Neville Payne, an English gentleman who was supposed to have entered Scotland on a treasonable mission, was put to this torture under a warrant superscribed by King William, and still shown in the Register House in Edinburgh. This is believed to be the last time that the boot was used. Its further use was prohibited by act of Parliament. Under the name of "Spanish boots," a similar

instrument was used in Germany. Iron boots, which were heated to an unbearable degree, are shown in some museums. Consult Bingham, *Dustillo* (London, 1888), for the boot in France.

BOOTAN, by-tin'. See **BHUTAN**.

BOOTES, bo-ŭ'tēz (Gk. *βοῦτης*, *boûtes*, the herdsman). A northern constellation known to the ancients. It is situated to the east of Ursa Major. Its principal star, Arcturus (q.v.), is the brightest star north of the celestial equator. ϵ and ξ Bootes are fine double stars. The components of the former are an orange star of the third magnitude and a greenish blue star of the sixth magnitude; those of ξ Bootis are of magnitudes 4.6 and 6.6 respectively—the former being yellow, the latter purple. The ancients conceived this constellation as representing a man grasping a club in one hand and holding by the other a leash of dogs barking at the Great Bear; in consequence, Boötes was often called *Arctophylax* (the bearward).

BOOTH (Icel. *búf*, MHG. *buode*, Ger. *Bude*, AS. *bīam*, to dwell). An unpretentious or temporary structure, a dwelling or hut or shelter of boughs, canvas, boards, or other light materials. In the Levitical legislation the Israelites were commanded to dwell in booths seven days in the seventh month, to keep the Feast of Tabernacles (Lev. xxiii. 39-43). The name came to be used of the stalls or tents at fairs for the installation and sale of wares, for shows, or refreshments, and later, of the permanent stalls in market buildings. In old London the most famous line of booths was on Cheapside, in Edinburgh on High Street ("the Booth row"); in these the various trades were usually grouped together. The term is also applied technically in the United States to the closets or screened inclosures in which the voters at an election mark their ballots.

BOOTH, AGNES (1843-1910). An American actress. She was born in Sydney, Australia, and first appeared there as a ballet dancer, but came to California when she was about 14 years old (1858). Her maiden name was Marion Agnes Land Rookes. In 1861 she became Mrs. Perry, in San Francisco, where she continued till 1865, attracting attention especially for her *Hermione* in *A Winter's Tale*. She came to New York in 1865 and appeared at the Winter Garden. The same autumn, at Niblo's Garden, she played with Edwin Forrest in a series of important rôles, including those of Julie to his Ruchelieu, and Desdemona and Ophelia. In 1866 she joined the Boston Theatre Company, of which she was a member for several years. In 1867 she was married to Junius Brutus Booth, Jr., its manager. Touring in 1874-76, she became well known as a star. In the spring of 1877 she made a great success as Cleopatra. From 1881 to 1891 she was with the Madison Square Company, among her popular parts being those of Nora in *Esmeralda* and Mrs. Ralston in *Jem the Penman*. Mr. Booth died in 1883, and in 1885 she became Mrs. John B. Schoeffel. After 1891 she left the stage and went to Europe, but upon her return resumed her work for a time, appearing from 1895 to 1897 in *The Sporting Duchess* and other pieces. Consult: Strang, in McKay and Wingate, *Famous American Actors of To-day* (New York, 1896); Clapp and Edgett, "Players of the Present," *Dunlap Society Publication* (New York, 1899); Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906).

BOOTH, BALLINGTON (1859-). The organizer and leader of the "Volunteers of America" (q.v.). He was born in London, the second son of William Booth, founder of the Salvation Army, and brother of (William) Bramwell Booth. In 1887 he was sent to the United States with his wife, Maud, and had charge of the work in this country till 1896, when, disagreeing with his father's plan of operations in the United States and Canada, he withdrew from the Salvation Army and organized a similar body under the name of the Volunteers of America. In order to bring the work of the new organization into closer harmony with that of the various churches, he obtained ordination as a presbyter of the Evangelical Church in Chicago. Both he and his wife are fluent writers and eloquent speakers. He published *From Ocean to Ocean* (1890). See **SALVATION ARMY**; **VOLUNTEERS OF AMERICA**.

BOOTH, BARTON (1681-1733). A celebrated English tragedian. He was of a Lancashire family, nearly related to Henry Booth, Earl of Warrington, and received a good education under the well-known Dr. Busby at Westminster, where he attracted notice by his acting in a Latin comedy (Terence's *Andria*). He was expected to enter the Church, but on being sent to Trinity College, Cambridge, he ran away in order to go upon the stage. Betterton (q.v.), to whom he applied, refused at first to help him, for fear of offending his family, and he went to Dublin, where he secured an engagement. Returning after some success to London, he was now received by Betterton and appeared in Lincoln's Inn Fields as *Maximus* in *Valentinian*. He won immediate recognition. At Drury Lane, in 1708, he received immense applause as the Ghost in *Hamlet*, a part in which he is said never to have had an equal. April 14, 1713, he acted Cato in Addison's tragedy, upon which he became quite the rage among the nobility, who vied with each other in placing their carriages at his disposal, and he frequently stayed over night at Windsor, where the court was then held. This seems to have been in some degree due to the political conditions of the time, since Whigs and Tories both professed the most complete approval of the character of Cato; yet Booth won high critical commendation. Among his greatest parts were Brutus, Othello, and Henry VIII. In 1716 he published *The Death of Dido: A Masque* and was the author of other poems. In 1728 he retired from the stage. He died at Hampstead, and was buried in Westminster Abbey. His second wife, Hester Santlow, herself an actress of reputation, survived him. Consult: Victor, *Memoirs of the Life of Barton Booth* (London, 1733); Genest, *History of the Stage* (Bath, 1832); Cilber, "Life and Character of Barton Booth," in *Lives and Characters of the Most Eminent Actors and Actresses* (London, 1753); and Galt, *Lives of the Players* (London, 1831).

BOOTH, RT. HON. CHARLES (1840-). An English statistician and writer on social questions. He was born in Liverpool, March 30, 1840, and now resides in London, though a member of the business firm of Alfred Booth & Co., Liverpool. His work entitled *Life and Labour of the People of London*, published in 10 vols. (1891-1903), is a storehouse of accurate social facts, dealing chiefly with the people of East London, and has won for him world-wide renown from men of science as well as from practical legislators.

Mr Booth is a fellow of the Royal Society (FRS) and was president of the Royal Statistical Society, 1892-94. In 1904 he was appointed a member of the Tariff Commission. He has taken an active part in the agitation in England for old-age pensions, in the support of which he has written several useful books: *Pauperism A Picture, and the Endowment of Old Age* (1892), *The Aged Poor, Condition* (1894), *Old-Age Pensions* (1899), *The Religious Influences of London* (1903). See OLD-AGE PENSIONS.

BOOTH, EDWIN THOMAS (1833-93). A distinguished American actor, the son of Junius Brutus Booth. He was born at Belair, Md., Nov. 13, 1833, and early showed his studious temperament. Brought up to the stage by his father, he made his debut in Boston in 1849. In 1851 he took his father's place as Richard III at the Chatham Square Theatre, New York. The next season they went to California, and after his father's return he remained in the West for several years, visiting also the Sandwich Islands and Australia (1854). He returned from California late in 1856, and after a tour in the South made, in Boston (April, 1857), an immense success as Sir Giles Overreach. Shortly afterward he repeated his triumph in New York. There, also, he became acquainted with Mary Devlin, whom he married in 1860. She died in 1863. It was in 1861 that he first appeared in London, where, after playing Shylock and Sir Giles, he won great popularity as Richefeu. In 1863 he took control of the Winter Garden, New York, and there his productions of *Hamlet* and other Shakespearean plays were famously successful. After the assassination of Lincoln by his brother, John Wilkes Booth, he retired temporarily from the stage, but reappeared in New York in January, 1866. He married, in 1869, Mary McVicker, who lived till 1891. In 1869 "Booth's Theatre" was built, where his success for a time was both artistic and financial, but the panic of 1873 made him a bankrupt. His tours in the years that followed, however, amply restored his fortunes. In 1880, and again in 1882, he visited Europe, and was received with the most flattering distinction, both in England and Germany. Some time after his return he formed a partnership with Lawrence Barrett, with whom he continued to appear till the death of Barrett in 1891. He himself then retired from the stage. He was generally regarded as the leading American tragedian, and, in a few great characters he was without a rival. His *Hamlet* was probably his most popular rôle, but his *Lear* and *Othello* were especially admired, besides other parts already mentioned. He was not a man of imposing bodily appearance, being rather below the medium stature, but his frame was compact, his carriage at once dignified and graceful, his eye piercing, his features grave. He was thoroughly absorbed in his parts, and his voice was under such complete control as to express, upon occasion, any shade of feeling, sentiment, or conviction. His rendering of familiar Shakespearean passages displayed a fine appreciation of their substance, and of the lights and shades of manner and expression by which their full meaning may be brought out. In his private life he was greatly esteemed. He was the founder and first president of the Players' Club, of New York, in the home of which, given by

himself, he died, June 7, 1903. Consult *Actors and Actresses of Great Britain and America*, ed. by Lawrence Hutton and Brander Matthews (New York, 1886), William Winter, *The Life and Art of Edwin Booth* (New York, 1894), Edwin Booth Grossman, *Edwin Booth, Recollections by his Daughter, and Letters to her and to his Friends* (New York, 1894), Asia Booth Clarke, *The Elder and the Younger Booth* (Boston, 1882), Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906), Henry A. Clapp, *Reminiscences of a Dramatic Critic* (Boston, 1902).

BOOTH, JAMES CURTIS (1810-88). An American chemist. He was born in Philadelphia and graduated at the University of Pennsylvania in 1829. He then remained one year at the Rensselaer Polytechnic Institute and in 1832 went abroad. There were at this time no regular organized student laboratories at German universities, and Booth continued his studies of chemistry at Wohler's private laboratory at Cassel. After further studies at Berlin, Vienna, and in England, he returned to Philadelphia, where in 1836, he established a laboratory for instruction in analytical chemistry, the first of its kind in the United States. Many distinguished chemists, such as Campbell Morfit, R. E. Rogers, J. F. Frazer, Thomas H. Garrett, and R. T. McCulloh, were educated at this institution. Mr Booth was professor of applied chemistry at the Franklin Institute from 1836 to 1845, and was superintendent of smelting and refining in the United States Mint at Philadelphia from 1849 to 1888, in which capacity he experimented with the nickel ores of Pennsylvania, introducing the fusion of that metal with other alloys in the coinage of cents during the year 1857. Among his principal works may be mentioned *Annual Reports of the Delaware Geological Survey* (1839), *Encyclopedia of Chemistry* (with Campbell Morfit, 1850), *On Recent Improvements in the Chemical Arts* (with Campbell Morfit, 1852), and a translation of Regnault's *Elements of Chemistry* (2 vols., 1853).

BOOTH, JOHN WILKES (1839-65). The assassin of President Lincoln. For several years he was an actor, but met with indifferent success and abandoned the stage in 1863. During the Civil War he was a violent secessionist and towards its close organized a conspiracy first for abducting the President and, later, for assassinating not only the President, but also the Vice President and the members of the cabinet. On the night of April 14, 1865, the President attended Ford's Theatre with his wife and several friends. About 10 P.M. Booth approached him unseen, and shot him through the head. Leaping from the box upon the stage, crying out, "Sic semper tyrannis!" The South is avenged!" he escaped by the stage door, where a horse was held for him. He had reached Bowling Green, near Fredericksburg, Va., before he was overtaken (April 26). Here he took refuge in a barn and, refusing to surrender, was shot after the barn had been fired. Most of his accomplices were subsequently captured, and four of them, Powell, Atzerodt, Herold, and Mrs. Surratt, were hanged. He was the son of Junius Brutus Booth and the brother of Edwin Booth. Consult Bates, *Escape and Suicide of John Wilkes Booth* (Memphis, Tenn., 1907).

BOOTH, JUNIUS BRUTUS (1796-1852). An English actor, on his mother's side a relation

of John Wilkes, the English statesman. When a boy in London, where he was born, he learned printing and after studying law, painting, and sculpture, received a commission as midshipman in the navy, but instead of going to sea he turned to the drama. He appeared on the provincial stage, Dec. 13, 1813, and in London, in October, 1815, at the Covent Garden Theatre. Here within two years he became a rival of Edmund Kean, whom he greatly resembled, though he more than once played Iago to Kean's Othello at Drury Lane. Booth gained great celebrity in Richard III and Sir Giles Overreach; but he was taken with a fancy for travel and, in 1821, arrived at Norfolk, Va. He spent most of the remainder of his life in the United States, where he was exceptionally popular, and esteemed by many critics to be the greatest tragedian of his time. Though his range of characters was not wide, the people never tired of the best of them, such as Richard III, Sir Giles, Lear, Shylock, Hamlet, and Iago. He was noted for his eccentricities, which at times verged upon insanity; and in acting he was so intensely carried away that the fencing matches in *Hamlet* and *Richard III* became duels in which Richmond and Laertes were sometimes compelled to defend themselves in earnest. Consult: Clarke, *The Elder and the Younger Booth* (Boston, 1882); Gould, *The Tragedian: an Essay on the Historic Genius of Junius Brutus Booth* (New York, 1868); Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906).

BOOTH, MARY LOUISE (1831-89). An American journalist, translator, and miscellaneous writer. She early devoted herself to making translations, among the most important of which were *About's King of the Mountains*, Cousin's *Secret History of the French Court* (1859), Pascal's *Provincial Letters*, Gasparin's *Uprising of a Great People* (1861), *America Before Europe* (1861), Laboulaye's *Paris in America* (1865), Cochin's *Results of Emancipation* (1862), and *Results of Slavery* (1862). All this work was done before the close of the Civil War, and in the meantime she had published a *History of the City of New York* (1859). She translated also some fairy tales of Laboulaye and Macé, Martin's abridgment of his *History of France* (1880), and part of the original work. An enlarged edition of her *History of New York* appeared in 1861, and a second revision in 1880. Miss Booth was editor of *Harper's Bazar* from its beginning till her death.

BOOTH, MAUD BALLINGTON (CHARLESWORTH) (1865-). A leader of the Volunteers of America, wife of Ballington Booth (q.v.). She was born near London, the daughter of a wealthy clergyman, early became interested in the work of the Salvation Army, and at the age of 17 left home and became a companion of Miss Catherine Booth in organizing a branch of the Army in Paris. There she remained two years, then went with a party of Salvationists to Switzerland, where, after suffering vicissitudes and even imprisonment, she finally succeeded in establishing a Salvation Army corps. In 1886 she married Ballington Booth and, in accordance with the custom of the Army, assumed her husband's rank as marshal. In 1896 she withdrew with her husband from the Salvation Army and founded the Volunteers of America, of which they became directors. She turned

her attention to prison work particularly. Her publications include: *Branded* (1897); *After Prison—What?* (1903); *Twilight Fairy Tales* (1906).

BOOTH, WILLIAM (1829-1912). An English religious leader and founder of the Salvation Army, born in Nottingham. He was the son of a contractor, who contrived to give him fair educational advantages. A private theological tutor coached him for preparation for the Methodist ministry, and at 23 years of age he began an evangelistic career, after having done a great deal of such work as a layman. He plunged into the mission field with great zeal, traveling over the greater part of England on itinerant preaching tours and making many thousands of converts. During one of his tours he met Catherine Mumford, to whom he became engaged and whom he married in 1855. After some years in settled pastorates, Mr. and Mrs. Booth conceived the idea of carrying the gospel to those whom all other missionaries had overlooked or shrunk from—the dwellers in sordid city slums. They laid a plan for such a campaign before the Methodist New Connection church, but this body found it too radical. Thereupon Booth, who now had three small children, separated from orthodoxy (largely upon the advice of his wife) and in 1865 began preaching in an old tent in a disused Quaker burial ground in Mile End Waste, one of the blackest corners of the East End of London. In 1878 he organized a body which he named the "Salvation Army" and the members of which he equipped with uniforms and flags, drums and cornets. The first appearances of this little band were greeted with riotous demonstrations, and in many cases the police sided with the roughs and arrested the Salvationists for obstructing the highways. A military form of government was prescribed, and Booth was given the title of "General," while officers below him were given subsidiary titles. As the work developed, General Booth and his wife carried out a long series of social reforms and charities. These included prison-gate missions, food and shelter depots, rescue homes, slum posts, children's homes, and other agencies for aiding and reforming the wretched and the criminal. The Salvation Army gradually spread all over the world, General Booth being in control, with International Headquarters in London. In 1906 a breach occurred between the General and his son, Ballington Booth, who had been given command of the Salvation Army in America, and when the latter was called upon to "farewell" from his command, in conjunction with several other territorial leaders, he deemed it best to withdraw from the Army and establish another organization called the "Volunteers of America" (q.v.). The Army, however, continued its work in this country.

In addition to his activity as head of the Salvation Army, William Booth wrote several books, the best known of which is *In Darkest England and the Way Out* (1890). His other writings include *Love, Marriage, and the Home*; *The Training of Children*; *Religion for Every Day*; *Letters to my Soldiers*; *Salvation Soldiers*; *Visions*; etc. He also founded the *War Cry*, the official organ of the Salvation Army, which has a weekly circulation of one million. The last four years of General Booth's life were clouded by the failure of his eyesight and by weakened health. After his death, on

Aug 20, 1912, a paper which had been prepared and sealed many years earlier was opened, and it was found that he had named as his successor his son, Bramwell Booth (qv), who for many years had been chief of staff in the Salvation Army. Consult G S Raiton, *Official Life of General Booth of the Salvation Army* (New York, 1912).

BOOTH (WILLIAM), BRAMWELL (1856-) An English religious leader, born in Halifax, Nova Scotia, a son of the founder of the Salvation Army, William Booth. He was educated in private schools, at the age of 18 took charge of the insurance of the international organization, and in 1880 was promoted to the office of chief of staff. In 1882 he married Capt Florence Soper of the Army. From this time on he served as his father's chief counselor, especially after 1896, when his brother, Ballington Booth (qv), broke from the parent organization and founded the Volunteers of America. On the death of Gen William Booth, in 1912, his son Bramwell became, by his father's will, general and commanding officer of the Salvation Army.

BOOTHBY, GUY NEWELL (1867-1905) An English novelist. He was born at Adelaide, South Australia, Oct 13, 1867. He was educated in England and traveled through Australia and in the East. His novels, mostly tales of adventure, became exceedingly popular. He was "discovered" by Rudyard Kipling, who saw in him the capabilities of a writer of stories. His fiction, much of which was written in England, amounted to nearly half a hundred novels, the *mise en scene* of some being placed in Australia. Notable among them are *The Beautiful White Devil* (1896), and *Dr. Nikola* (1898). See AUSTRALIAN LITERATURE.

BOOTHIA (booth'ia) **FELIX** A peninsula about 180 miles long and with a greatest width of about 50 miles, its northern end, Murchison Point, being the most northern extension of the American continent (Map Canada, M 2). Towards the south it contracts to a narrow isthmus, while on the north Bellot Strait (qv) separates it from North Somerset Island. It was discovered by Sir John Ross during the most famous of his voyages (1829-33) and named after Sir Felix Booth, the chief contributor to the expedition. It was supposed at the time to reach as far north as Barrow Strait. Near Cape Adelaide, on the west coast, Sir John's nephew, Lieutenant, afterward Sir, James Clark Ross, first located the northern magnetic pole on June 1, 1831, in 70° 5' N lat and 96° 47' W long. Consult Ross, *Narrative of a Second Voyage in Search of a Northwest Passage* (London, 1860).

BOOTHIA, GULF OF An inlet of the Arctic Ocean separating Boothia Felix, in northern Canada, from Cockburn Island and Melville Peninsula (Map Canada, M 2).

BOOTH-TUCKER, EMMA MOSS (1860-1903) An officer in the Salvation Army. She was born at Gateshead, England, and was a daughter of Gen William Booth and the wife of Commander Booth-Tucker. She held the rank of consul in the organization and exercised joint jurisdiction with her husband over the Army in the United States. In 1880-88 she was in charge of the "International Training Homes" of the Army. She was killed in a railroad wreck at Dean Lake, Kans., Oct 29, 1903.

BOOTH-TUCKER, FREDERICK ST GEORGE DE LATOUR (1853-) Commander of the Salvation Army in the United States. He was born at Monghyr, Bengal, India, and passed the Indian civil-service examination in 1874. After studying in London (1874-76) he was appointed to an official position in the Punjab, from which, however, he resigned in 1881 to join the Salvation Army. He inaugurated the Indian branch of that organization in 1882 and conducted it till 1891, when he went to London as secretary for the international work. From 1896 until 1905 he was in charge of the United States division of the service, with headquarters in New York City. His works include *Life of Gen William Booth* (1898), *Favorite Songs of the Salvation Army*, *Monograph for the Paris Exposition on the Work of the Salvation Army in the United States* (1900), *Farm Colonies of the Salvation Army* (1903).

BOOTKIN, or BOOTS. See Boot.

BOOTLE A town in Lancashire, England, at the mouth of the Mersey. Although an independent municipality, it is practically a northern suburb of Liverpool. About 110 acres of the Liverpool dock system, including some of the most important docks, are within the boundaries of Bootle. The town was incorporated in 1868 and was created a county borough in 1888. It obtains its water supply from Liverpool. It owns an electric plant which supplies the current for lighting purposes and for motive power for street railways, which the corporation owns, but leases to the Liverpool corporation. The town maintains numerous parks, public baths, a gymnasium, and an isolation hospital. Among its educational institutions are a technical school, a public library, and a museum. It has foundries and grain mills. Pop., which has increased rapidly, 1881, about 27,000, 1891, 49,200, 1911, 69,881.

BOOTS AND SADDLES. A bugle or trumpet call for cavalry or light artillery drill or other mounted duties. See BUGLE AND TRUMPET CALLS.

BOOTT, FRANCIS (1813-1904) An American composer, born in Boston, Mass., of English parentage. He studied music in Florence and became honorary professor in the Academy of Fine Arts. His first work appeared under the name of Telford. He left the sum of \$10,000 to Harvard University for a prize for compositions by native composers. He composed a *Mass* for voices and orchestra, *Te Deum*, *Miserere*, *Maia Mater*, *The Sands o' Dee* (Kingsley's poem), and many songs.

BOOTTOPIPING In wooden ships not sheathed with copper it was the custom when far away from a dock—particularly in warm climates—occasionally to scrape off the grass, barnacles, and other matter adhering to the side in the vicinity of the water line and apply a mixture of grease, sulphur, and tar as a temporary protection against worms. This operation was called *boottopping*. The name is now applied to that portion of the hull of iron and steel ships which is below the load water line, but above water under ordinary circumstances. It is commonly painted red, green, or black except on ships of war, which have all visible parts painted gray like the rest of the hull. The frequent painting of this part of a vessel is not done merely for the sake of appearance, but for preservation as well, the portion of the side which is sometimes wet and some-

times dry being much more liable to corrosion than the plating above or below it.

BOO'TY (Ger. *Beute*, Dutch *buit*; cf. Icel. *byti*, exchange, barter, Sw. *byte*, barter, booty). In military usage, the property captured from the enemy. Booty is not recognized officially in the army of the United States; though prize money, its naval equivalent, is, anomalously enough, still a prominent feature of naval warfare, the naval blockade in the Spanish-American War (1898) and the battle of Santiago furnishing notable examples. The regulations concerning booty in the British army are clearly defined, such booty being apportioned as the king, through his advisers, may direct. There are few regiments in the British service that have not among their regimental effects articles of more or less value, such as bric-à-brac, mess plate, heathen images, etc., taken from enemies. Booty of a more concrete and valuable description is collected and afterward sold, and the proceeds divided. By law, all booty is the property of the sovereign and may, at his discretion or pleasure, be returned to the enemy or given to the captors. Similar laws obtain with all other European countries. The siege of Peking (Boxer uprising in China, 1900) furnishes one of the best illustrations of modern looting. After the defenses were rushed, and the city taken, civilians as well as the international troops seized and carried off anything and everything worth their while. The peculiar nature of the campaign, however, and the worldwide criticism of this wholesale looting, induced most of the Powers concerned to return the booty to the Chinese government. The idea of taking booty, which is as often as not property of noncombatants, has been abandoned by practically all armies of countries within the family of nations. See **LOOT**; **PRIZE**.

BO-PEEP, **LITTLE**. The little shepherdess whose story is a never-failing source of interest to the nursery world. The origin of the name and its application are unknown, but Halliwell, in his *Nursery Rhymes*, quotes from a ballad of the seventeenth century, which has the couplet:

"Half England's nowt now but shepe,
In everye corner they plays a boe-pepe."

BOPP, **böp**, **FRANZ** (1701-1867). A distinguished German philologist. He was born in Mainz, Sept. 14, 1791, began the study of Oriental languages in Aschaffenburg, and in 1812 went to Paris, then the centre of Oriental studies, where he was encouraged in his labors by Chézy, Silvestre de Sacy, and August Wilhelm von Schlegel. He afterward visited London, to pursue further the study of Sanskrit, and in 1821 was appointed professor of philology and Oriental literature in the University of Berlin. His first publication, *Ueber das Konjugations-system der Sanskritsprache* (Frankfort, 1816), proved epoch-making. In 1820 he published in English, in the *Annals of Oriental Literature*, an article in which he developed the ideas presented in his first work. It was entitled "Analytical Comparison of the Sanskrit, Greek, Latin, and Teutonic Languages, showing their Grammatical Structure." This was followed by a Sanskrit grammar (originally published in Latin, 1820-32, and then in German, 1834), a *Glossarium Sanscritum* (1830), and editions of several fragments of the great Indian epic, the *Mahābhārata*, in the original text, with a translation. His most important labors centred in

the analysis of the grammatical forms of the different languages of the Indo-Germanic family, through which he became the founder of the science of comparative philology. His great work is a comparative grammar of the Sanskrit, Zend, Armenian, Greek, Latin, Lithuanian, Old Slavic, Gothic, and German (*Vergleichende Grammatik*, etc., Berlin, 1833-52—a second edition, entirely recast, appeared in 1857, and a third was published after his death in 1868-71). An English translation by Eastwick was published in 3 vols., 1845-50, and a French translation by Bréal (Paris, 1866-72). During the publication of his masterwork Bopp found the time to write important dissertations on Celtic (1838), Malay-Polynesian languages (1840), Georgian (1846), Borussia (1853), Albanian (1854), and his *Vergleichender Akcentuations-system* (1854), all of which reveal an extensive knowledge as well as a remarkable intellectual activity. In his honor the *Bopp-Stiftung*, for the promotion of the study of comparative philology, was founded in Berlin in 1866. His library was purchased by Cornell University. He died Oct. 23, 1867. Consult Lefmann, *Frans Bopp* (Berlin, 1891-97); Introduction to Bréal's translation. See **PHILOLOGY**.

BOPPARD, **böppärt** (ancient Bodobriga). A town in the district of St. Goar, Prussia, on the left bank of the Rhine, 9 miles south of Coblenz. It is an ancient and picturesque walled town with dark, narrow streets and mediaeval timbered houses. Among its notable buildings are the old castle of the archbishops of Treves, the tower of which is now utilized for the law courts; the Pfarrkirche in late Romanesque, dating from the twelfth century; the Gothic Carmeliterkirche of the thirteenth century containing interesting sculpture and paintings, and the famous hydropathic establishment, the Marienbegr, occupying a former Benedictine nunnery. Boppard is of Celtic origin; it was fortified by the Romans as a depot for their slingers, "Balistarii Bodobrigae," and important remains of Roman walls and fortifications still exist. Boppard was a free Imperial city in the twelfth century, and many councils were held there. Pop., 1900, 5800; 1910, 6396.

BOR, **bör**, **PIETER CHRISTIAENSZON** (1559-1635). A Dutch historian, born in Utrecht. He studied history extensively, and in 1615 was appointed historiographer of Holland and West Friesland. His most important work is the *Oorsprong, begin, ende vervolg der nederlandse Oorlogen* ('The Causes, Beginning, and Course of the Wars of the Netherlands,' 1679), in the preparation of most of which he had access to the archives of the Dutch States. In style the work is little more than a monotonous chronicle, but as a source book it is highly valued.

BORÁ (It. dial. variant of *borea*, north wind, Lat. *boreas*, Gr. *Boréas*). The bore is a violent, gusty, northeast wind, usually dry and cold, which sometimes visits the Adriatic and the Black Sea during the winter. Its gusts have attained velocities higher than 60 meters per second (134 miles an hour), and its violence whips the waves into so fine a spray that the waterdust forms a peculiar haze over the sea. This wind owes its force and temperature to a special topographic combination, viz., an elevated back country shut off from a warm sea by a moderately high coastal range. In the winter, and particularly under the influence of a high pressure, the elevated inland cools to

very low temperatures, but the sea remains relatively warm. When a centre of low pressure passes over the sea and a marked high centre builds up rapidly over the inland plateau, the cold plateau air is forced to rush rapidly from the mountains to the warmer low-lying sea. This downrush gives the violent cold wind from Istria and Dalmatia, lying along the northeast coast of the Adriatic. Hence the name "bora," or "stormy northeast wind" at Trieste, Fiume, etc. The bora extends but a short distance from the land, nor is it very noticeable far back from the summits whence it flows. The same kind of wind, due to the same causes, is met at Novorossisk on the northeast shore of the Black Sea. Here, however, the temperature of the wind is much lower, due to the colder hinterland and the smaller vertical fall to which the air is subjected. The Adriatic bora rarely falls to freezing, but at Novorossisk the icy spray from the sea often coats the ships with a dangerously heavy load of ice.

BORA, KATHARINA VON (1499-1552) The wife of Luther, daughter of Anna, of the Haugwitz family. She was born at Klein-Laussig, near Bitterfeldt, Saxony, on Jan 29, 1499. When 10 years old, she entered the Cistercian convent of Nimptsch or Nimbschen, near Grimma. Becoming acquainted with Luther's doctrines, she found herself very unhappy in her monastic life, and finally, along with eight other nuns, whose relatives, like her own, refused to listen to them, she fled from the convent, with the knowledge of Luther and the active assistance of Leonard Koppe, a member of the city council of Torgau, on the nights of April 4 and 5, 1523. They arrived in Wittenberg on April 7. Luther took up a collection for them and wrote to their relatives, who declined to receive them. He then arranged for them to live with honorable people. Katharina became an inmate in the house of the burgo-master Reichenbach. Luther, through his friend, Nicholas von Amsdorf, minister in Wittenberg, offered her the hand of Dr Kaspar Glaz, pastor in Orlamunde. She declined this proposal, but declared herself ready to marry Von Amsdorf, or Luther himself, who had already laid aside his monastic dress and was living by himself in the deserted Augustinian monastery. There her marriage with Luther took place on June 13, 1525. In his wife Luther found an affectionate and faithful helpmeet. Six children were born to them: (1) Hans, or Johannes, born June 7, 1526, (2) Elizabeth, born Dec 10, 1527, died Aug 3, 1528, (3) Magdalena, born May 4, 1529, died Oct 20, 1542, (4) Martin, born Nov 7, 1531, (5) Paulus, born Jan 28, 1533, (6) Margaretta, born Dec 17, 1534. After Luther's death the Elector of Saxony and Christian III of Denmark contributed from time to time to Katharina's support. She was involved in the losses and disasters of the Schmalkald War and was for a while very poor. She fled from Wittenberg to Torgau to avoid the plague, but on the way met with an accident, and sickened and died at Torgau on Dec 20, 1552. For her life, consult F G Hofmann (Leipzig, 1846). A Stein, pseudonym for H Nietschmann (Halle, 1879, 3d ed, 1886), A Thoma (Berlin, 1900), Krokén, *Katharina von Bora* (Leipzig, 1906).

BORACIC (bó-rás'ík) **ACID** See BORIC ACID

BORACITE (from *borax*) A magnesium

chloroborate that crystallizes in tetrahedral forms of the isometric system. It is usually white, although sometimes found in gray, yellow, or green shades, due probably to slight impurities. The principal places in which it is obtained are the vicinity of Lüneburg, Hanover, Holstein, several places in France, and Stassfurt, Prussia, where a massive variety occurs. It has been prepared artificially by Heintz.

BORAGE, bú'rāj (LL *borago*, from *borra*, *burra*, rough hair), *Borago*. A genus of plants of the family Boraginaceæ, having a wheel-shaped corolla, the mouth of which is closed with five teeth, and forked filaments, of which the inner arm bears the anther, the anthers connivent around the style, in the form of a cone. There are three species, natives of the countries around the Mediterranean. The common borage (*Borago officinalis*) is found in waste places in many parts of Europe, is pretty frequent—perhaps naturalized—in Great Britain, and introduced into various parts of the United States. It is a plant of rather coarse appearance, with a stout, erect herbaceous stem, one to two feet high, somewhat branched, the lower leaves elliptical, obtuse, tapering to the base, the stem, leaves, flower stalks, and calyx rough with hairs. The flowers are more than half an inch broad, of a beautiful blue color. Borage was formerly much cultivated and highly esteemed, being reckoned among the "cordial" flowers and supposed to possess exhilarating qualities, for which it no longer receives credit. The belief in its virtues was at one time extremely prevalent in England and its use accordingly universal. The flowers were put into salads, Gerard tells us (1597), "to make the mind glad", and he adds "There be also many things made of them, used everywhere for the comfort of the heart, for the driving away of sorrow, and increasing the joy of the mind." Like some other plants of the same family, borage contains nitrate of potash (nitre) and is slightly febrifuge. It is mucilaginous and emollient and has been used in pectoral affections, its leaves impart a coolness to beverages in which they are steeped, and with wine, water, lemon, and sugar, enter into the composition of an English drink called "cool tankard." The young leaves and tender tops are pickled and occasionally used for salad in parts of Europe. The flowers bear an abundance of nectar, and borage has quite a reputation as a bee plant.

BORAGINACEÆ (Neo-Lat *Boraginaceus*, pertaining to Borage, see BORAGE) A family of dicotyledonous plants consisting chiefly of herbs, but also containing a few shrubs and trees. The leaves are generally rough, with hairs which proceed from a thick, hard base, and the whole plant is mucilaginous and emollient. On account of the harshness and roughness of the plant, the name *Asperifolia* has been given to the family. The leaves are alternate and without stipules. The flowers are in spikes, racemes, or panicles which are almost always coiled up, and gradually uncoil and elongate themselves, the flowers expanding in succession. The calyx is 4- to 5-partite and remains till the fruit is ripe, the corolla is generally regular, 4- to 5-cleft, imbricated in bud, the stamens rise from the corolla and are equal in number to its divisions, generally five, and alternate with them. The ovary is 4-partite, 4-celled, the style simple, arising from the base of the lobes of the ovary. The fruit consists of 4, or sometimes of 2, distinct

achenia in some cases; the nutlets are often covered with hooked spines. There are about 1500 known species of Boraginaceae distributed among 85 genera. They are widely distributed and are particularly abundant in the south of Europe and in the temperate part of Asia. The most familiar members of the family are such prized plants as heliotrope and forget-me-not, and such weedy plants as hound's tongue, stickseed, comfrey, bugloss, and puccoon.

BORAH, bŏ'rá, WILLIAM EDGAR (1856-). An American legislator. He was born at Fairfield, Ill., and was educated at the Southern Illinois Academy and the University of Kansas. He began the practice of law at Lyons, Kans., in 1889, removing two years later to Boise, Idaho. He was elected United States Senator for Idaho for the term of 1907-13, and was a member of the Republican National Committee in 1908-12. At the time of the Republican split in 1912 Borah denounced Taft's nomination as fraudulent, but did not leave his party, preferring to be classed as a progressive Republican rather than a Roosevelt-Progressive. He was reelected United States Senator in 1912 and was active in affairs of state during 1913. In that year he directed his efforts against the growth of imperialism, attacking Secretary Bryan's plan to create a United States protectorate over Nicaragua, and introduced a bill (defeated) for raising the income exemption to \$4000.

BORÁS, bŏŏ-rŏs' or -rās'. A town in the district of Elfsborg, Sweden, situated on the river Viske, 36 miles east of Gothenburg. The town has a technical institute and school for weavers and is a textile centre (Map: Sweden, E 8). Pop., 1904, 17,842; 1911, 21,097. It was founded in 1632 by Gustavus Adolphus.

BORAS/S PALM. See PALMYRA PALM.

BO'RAX (Ar. *bŏrag*, *bŏrag*, Pers. *bŏrah*), or SODIUM BIBORATE. An inorganic salt crystallizing in the monoclinic system. It occurs native as a saline efflorescence and in monoclinic crystals on the shores of a series of lakes, covering a large extent of country, in Ladak, Ceylon, Transylvania, Peru, Chile, in Borax Lake, and other places in southern California and in various localities in Nevada. Borax is a clear, white, translucent crystalline compound, soluble in water, and having a pleasant, sweetish taste. The crude material called tincal, from Tibet, Asia, is sent on sheep's backs over the Himalaya Mountains to Calcutta, and thence to Europe, where it is purified. The product on the Pacific coast, which was discovered in 1864 at Clear Lake and subsequently in many other places, is refined in Alameda and Searles, Cal., and also in New Jersey. At Alameda the crude material is dissolved in water, and heated with sodium carbonate in a digester; the resulting solution is drawn into cooling and crystallizing tanks, where the borax forms on steel rods which are suspended in the vats. The product thus obtained is refined by successive crystallizations until the desired degree of purity is reached. A new plant was under construction at Searles in 1913 where the method of refining was to be entirely different from that at Alameda. An important source of commercial borax is found in the volcanic rocks of Tuscany, Italy, where the process, invented in 1818, is as follows: boric acid, either as vapor or solution, is added to a solution of sodium carbonate, which is dissolved in a covered lead-

lined vessel and heated with steam. The solution of borax thus obtained is evaporated until crystals form. Much more important at present than any of these sources is the calcium borate, locally known as colemanite, found in San Bernardino Co., Cal.; and for several years the production in the United States has come almost entirely from this source. The crushed mineral is washed to remove soluble impurities and then boiled with a slight excess of sodium carbonate. The sodium borate obtained is purified by recrystallization. The mineral pandermite found in Asia Minor is also a calcium borate and is extensively worked. Next to the United States, Chile produces the largest amount of borax, the ore being a sodium calcium borate. Borax is extensively used for household purposes. It is also employed as a solvent for resins, albumens, fatty acids, and certain organic bodies; also as a detergent, either by itself or in borax soaps, loosening dirt without injury to the finest laces; and as an antiseptic and disinfectant. It also finds extensive application as a flux for the glazing of pottery and chinaware and in the making of enamels. Its property of dissolving metallic oxides makes it useful in soldering metals. It is used as a flux in assaying gold and silver ores and in the refining of bullion and as a reagent in chemical analysis. Finally, it is often used in medicine. The production of borax in California gradually increased from 5950 tons in 1905 to 53,330 tons in 1911, valued at \$1,569,151. Efforts are being made to stimulate the consumption of borax along all possible lines, and a number of new uses in various commercial forms have been found, and at the same time the consumption has materially lessened in other industries. The average American annual output, taken by four-year periods, was as follows: 1895-99, 9914 tons; 1900-04, 28,829 tons; 1905-10, 44,358 tons. Consult *Mineral Resources of the United States* (Washington, annual), and *Annual Bulletin No. 24, California State Mining Bureau*.

BORCHARDT, bŏrk'ärt, KARL WILHELM (1817-80). A German mathematician, born in Berlin. He studied at the University of Berlin and at that of Königsberg, under Jacobi, and in 1848 became a lecturer in the University of Berlin. In 1856 he was made a member of the Academy of Sciences and assumed the editorship of the *Journal für die Reine und Angewandte Mathematik*. His studies regarding determinants were particularly valuable. His complete works have been edited by G. Hettner under the auspices of the Academy of Sciences (Berlin, 1888).

BORCHGREVINK, bŏrk'grē-vīnk, CARSTEN EGBERG (1864-). A Norwegian scientist and explorer, born in Christiania. He studied there and at the Royal Saxon School of Forestry, Tharandt, and in 1893 emigrated to Australia, where he was a surveyor in New South Wales and Queensland, and an instructor in languages at Coorwell College, New South Wales. In 1894-95 he accompanied a whaling expedition to the South Seas, and in 1895 presented to the Sixth International Geographical Congress, assembled in London, the results of his observations within the Antarctic Circle. On Aug. 22, 1898, he set sail from London for the South Pole, in command of the *Southern Cross* expedition, organized by Sir George Newnes, proprietor of the *Westminster Gazette* and the *Strand Magazine*. He effected a land-

ing at Cape Adare, South Victoria Land, on Feb 17, 1899, erected a station, and spent nearly a year there in exploration and scientific investigation. (*The Southern Cross* was sent to New Zealand on March 2, 1899, and returned on Jan 28, 1900) The expedition mapped the coast about Robertson Bay, discovered a new island, which was named after the Duke of York, studied Antarctic flora and fauna, found the south magnetic pole to be in (approximately) lat 73° 20' S and long 146° E, and with sledges reached the then "farthest south"—lat 78° 50' Consult Borchgrevink, *First on the Antarctic Continent* (1901, in Norwegian-Danish, 1903, in German, 1905)

BORDA, bôr'da', JEAN CHARLES (1733-90) A French mathematician, born in Day, France In 1756 he was made associate member of the Academy of Sciences for a paper on the movement of projectiles In 1771 he was associated with Verduin de la Crenne and Pingre in proving the accuracy of chronometers He also devoted much attention to the subject of shipbuilding and suggested important improvements in the form of vessels Along with Delambre and Méchain, he was a leading member of the French commission intrusted with the measurement of the meridian arc comprised between Dunkirk and Barcelona He rendered essential service in the commission that developed the metric system of weights and measures He invented a new instrument for measuring the inclination of the magnetic needle, and his corrections of the seconds pendulum are still in use He is best remembered, however, for his improvement of the reflecting circle, on which instrument he published a work in 2 vols, *Description et usage du cercle à réflexion* (1787)

BORDE, bôrd, ANDREW See BOORDE, ANDREW.

BORDEAUX, bôr'dô' (anciently, Lat *Burdigala*, from, perhaps, a Celtic or Iberian source) One of the most important seaports of France, seat of an archbishop, and capital of the department of Gironde (Map France, S, D 4) It is beautifully situated in a plain on the left bank of the Garonne, about 60 miles from its mouth in the Atlantic Ships of more than 1000 tons' burden can easily ascend the river at high water to Bordeaux, which is accessible at all times to vessels of 600 tons Its harbor is capacious and counts a floating dock among its many facilities It is the fourth French port, and is an important centre of the French cod-fishing ships for Newfoundland and elsewhere Tonnage entered and cleared in 1910, 5,646,000 The river is crossed by a noble bridge of 17 arches, 1534 feet in length, erected by the elder Deschamps in 1811-21 The old town, consisting partly of high wooden houses of the fifteenth century, has narrow, crooked streets, but the newer parts of the city and the suburbs have wider streets, fine squares, and pleasant promenades, lined with trees The cathedral of Saint-André, which was consecrated in 1096, is remarkable for its beautiful towers, 160 feet high The church of Saint-Croix is a Romanesque basilica of the twelfth and thirteenth centuries, that of Saint-Seurin dates from the eleventh to the fifteenth The former archiepiscopal palace is used as a town hall The university numbers 100 professors and 2300 students The city possesses a public library of about 200,000 volumes and 1563 MSS, including a MS copy of Montaigne's essays

The principal branches of industry include the production or manufacture of sugar, brandy, liquors, vinegar, nitric acid, printed calicoes, woolen goods, carpets, hats, paper, earthenware, glass bottles, metallic wares, and re-inous articles The rope works, cooperages, and dockyards are extensive and full of activity The Canal du Midi, connecting Bordeaux with the Mediterranean, enables it to supply the whole south of France with the colonial produce which it imports, and also with English tin, lead, copper, coal, dyestuffs, herrings, etc Wine, brandy, vinegar, dried fruits, hams, turpentine, and glass bottles are among its principal exports

Except the wines of Champagne, no French wines are so much exported to foreign countries as those grown in the district of Bordeaux and known as Bordeaux wines Some of them are red (known in England as claret), others white Of the red wines, Medoc is one of the best known The red wines produced by the vineyards of Château-Lafitte, Château-Latour, Château-Margaux, and Haut-Brion are particularly celebrated for their quality The white wines of Graves, Sauternes, Barsac, Preignac, and Langon are in the highest repute Pop (communal), 1896, 256,908, 1901, 256,638, 1906, 251,947, 1911, 261,678 (municipal pop, 250,236)

In ancient times Bordeaux was called *Burdigala* and was the capital of the Bituriges *Vivisci* It was a very prosperous town in the time of the Romans, was made in the fourth century the capital of *Aquitania Secunda*, and was both the principal emporium of the southwest of Gaul and the seat of its best educational institutions Its history follows the same course as the general history of Aquitania It was sacked by the Saracens in 720, passed to the Carolingians, and was capital of the Kingdom of Aquitania It was plundered by the Northmen in the ninth century It became the capital of the Duchy of Guienne and in 1152 passed, by the marriage of Eleanor of Guienne with Henry of Normandy (afterward Henry II of England), under his dominion Bordeaux was for a considerable time the seat of the splendid court of Edward the Black Prince During the Revolution Bordeaux was the principal seat of the Girondists and suffered fearfully at the hands of the Terrorists Its inhabitants declared for the Bourbons in 1814 During the Franco-Prussian War a delegation of the Government of National Defense, retreating before the advancing German army, stationed itself, December, 1870, at Bordeaux, and the first sittings of the National Assembly were held there in 1871 Rosa Bonheur was born in Bordeaux Consult Lourget, *Documents relatifs au port de Bordeaux* (Bordeaux, 1889), Julian, *Histoire de Bordeaux depuis les origines jusqu'en 1895* (Bordeaux, 1895), Mauriac, *L'Association de Bordeaux* (Bordeaux, 1890), Saunier, *Bordeaux* (Paris, 1909)

BORDEAUX, DUO DE See CHAMBORD, HENRI CHARLES

BORDEAUX, UNIVERSITY OF A university founded in 1441, while Bordeaux was under English rule, by combining earlier convent and cathedral schools and a school of medicine Its privileges, confirmed by Louis XI, made it self-governing till the time of Francis I Thenceforward it was under state control In 1808, at the Napoleonic reform of the universities, it received faculties of science and of letters, in 1870 a faculty of law, and in 1875 a faculty of medi-

cine and pharmacy. In 1912 it had a budget of 299,972 francs, and 2528 students, of whom about 800 were in medicine and 962 in law. In the library there are some 10,000 volumes. Connected with the university is the Marine Zoological Laboratory of Archachon.

BORDEAUX MIXTURE. See FUNGICIDES.

BORDEN, SIR FREDERICK WILLIAM (1847-). A Canadian political leader, born at Cornwallis, Nova Scotia. He studied at King's College, Windsor, N. S., and at the Harvard Medical School, and began the practice of medicine at Canning in 1868. He was elected to the Dominion parliament in 1874 from King's, N. S., and continued to represent that constituency with the exception of the years 1883-86. Long identified with the militia forces of the country, he became in 1896 Minister of Militia and Defense in the Laurier cabinet, a position which he held for 15 years. On the outbreak of the Boer War in 1899, he was active in the organization and equipment of the Canadian forces sent to South Africa in aid of Britain. In 1905 he arranged with the Imperial government for the assumption of the defenses at Halifax and Esquimaux by the Dominion forces. He organized the Canadian militia under the Act of 1904, which placed the land forces under a militia council modeled after the British Army Council; and he took a prominent part in the London conferences at which Canadian coöperation in Imperial defense was discussed. He was a delegate to the Colonial Conference in 1907, the Imperial Defense Conference in 1909, and the Imperial Conference in 1911. He also became a member of the Imperial Council of Defense. In 1902 he received the honor of knighthood. He lost his seat in the Canadian Parliament at the general election of 1911, which resulted in the defeat and resignation of the Laurier cabinet.

BORDEN, RT. HON. ROBERT LAIRD (1854-). A Canadian statesman. He was born at Grand Pré, Nova Scotia, and was educated at the Acadia Villa Academy, Horton. In 1872 he became an instructor in the Glenwood Institute, N. J., but afterward returned to Nova Scotia and studied law at Halifax. He was called to the bar in 1878 and practiced law first at Kentville and afterward at Halifax. He soon became notable in his profession and appeared as counsel in important cases in which his knowledge of maritime and constitutional law gained him a wide reputation. For an extended term he was president of the Nova Scotia Barristers' Society. He was elected a Conservative member of the House of Commons in 1896, and in 1901 he succeeded Sir Charles Tupper (q.v.) in the leadership of the Conservative Opposition. He was the first Canadian Opposition leader whose position was officially recognized by the payment of an additional parliamentary indemnity, which in 1905 was fixed at \$7000 a year. In 1904 he lost his seat for Halifax at the general election, but in 1905 was reelected for Carleton and in 1908 for Halifax. He did not at first oppose the policy of the Canadian naval service established by the Laurier administration in 1910, but he advocated an immediate emergency contribution of the cash equivalent of a fleet unit, or of a powerful battleship. After the Liberal defeat in 1911 on the issue of reciprocity with the United States (see CANADA, *History*), Borden became Premier. In 1912 he visited England to confer with the British government in regard to the naval situation, and during the

parliamentary session after his return he introduced a measure providing for a contribution of \$33,000,000 for the construction of three battleships of the largest size, to be at the disposal of the British government. After prolonged discussion the bill passed the House of Commons, but was rejected by the Senate. In 1912 Borden was appointed a member of the Imperial Privy Council.

BORDENTOWN. A city in Burlington Co., N. J., on the Delaware River, 6 miles southeast of Trenton, on the Pennsylvania Railroad, and the terminus of the Delaware and Raritan Canal (Map: New Jersey, C 3). It contains Bordentown Military Institute. The city is the market and shipping point for a tributary agricultural district and has extensive manufacturing interests, represented by worsted mills, machine shops, and iron works of various kinds, shipyards, brickyards, and other industrial plants. Bordentown was incorporated first in 1849, and the commission form of government was adopted in 1913. The water works and sewage system are owned by the city. Pop., 1890, 4232; 1900, 4110; 1910, 4250. Near Bordentown Joseph Bonaparte (q.v.) lived in 1817-32, and 1837-39; his fine park, and "Ironside," the home of Rear Admiral Charles Stewart (q.v.), are among the city's notable features. Prince Murat, the son of Marshal Joachim Murat (q.v.), also lived here for many years prior to 1848. Consult Woodward, *Bonaparte's Park and the Murats* (Trenton, 1879).

BORDER (Fr. *bordure*, edge, of Teutonic origin; cf. MHG. *borte*, border), THE. A term employed in historical as well as popular phraseology to signify the common frontier of England and Scotland. The border shifted to and fro frequently in former times. At present the dividing boundary of the two countries consists of natural and imaginary outlines. It is customary to speak of Scotland as a country "north of the Tweed"; but the Tweed is the boundary for only about 16 to 18 miles. At Carham Burn the line proceeds toward the Cheviot Mountains, which form the boundary for about 25 miles; thence it strikes Kershope Water, a tributary of the Esk. That river is the boundary for a number of miles, to a point above Longtown, where the line quits the Esk abruptly in a northerly direction and, taking into England part of what was known as the "Debatable Land" (q.v.), strikes on the small river Sark, which is the boundary to the Solway Firth, the great natural division on the west. Such, in general terms, is the entire boundary, extending from sea to sea for about 100 miles. The counties lying on the English side of the border are Northumberland and Cumberland; on the Scottish side, Berwickshire, Roxburghshire, and Dumfriesshire. From the eleventh till the end of the seventeenth century there was almost constant disturbance on the border. Ruthless wars on a great scale between English and Scots sometimes caused the most frightful devastation and became the source of lasting ill will on both sides.

In the present day there is nothing to distinguish the border from other districts of the country, unless it be the prevalence of picturesque ruins of old castles, which are generally roofless, but whose walls, of vast thickness and strength, are still in a good state of preservation. The border strongholds were of three kinds—regular fortresses, large baronial castles,

and the lesser kind of towers. For an account of these and other architectural remains on the Border, consult *Border Antiquities of England and Scotland*, by Sir Walter Scott (2 vols., folio, illustrated with plates), also Billings' *Baronial and Ecclesiastical Antiquities of Scotland* (4 vols., 4to), illustrated with plates (Edinburgh and London, 1848-52).

The greatest channels of communication across the Border are two railway routes, one by way of Berwick and the other by Carlisle. There are also good roads in various directions for those who wish to explore this extremely interesting district. Besides the books already referred to, there are works of local note, among which the most comprehensive are Richardson, *Romance of English and Scottish Border* (Newcastle-on-Tyne, 1846), Jeffrey's *History and Antiquities of Roxburghshire* (3 vols., London, 1851-64), Ridpath's *Border History* (1 vol., 4to, London, 1776), Veitch's *History and Poetry of the Scottish Border* (Glasgow, 1877), Craig-Brown's *History of Selkirkshire* (Edinburgh, 1886), Oliver's *Upper Teviotdale and the Scots of Buccleugh* (Edinburgh, 1887), Crockett's *In the Border Country* (London, 1906), Lang's *Land of Romance* (London, 1910).

BORDER MINSTREL, *See* SCOTT, SIR WALTER.

BORDER RUFFIANS In American history, a name applied to the proslavery residents of Missouri, who, in 1854 and thereafter, crossed over into Kansas for the purpose of turning the elections and of committing depredations on the "Free-State" settlers. *See* KANSAS.

BORDER STATES In American history, the name applied to those slave States which at the outbreak of the Civil War were contiguous to the more southerly of the free States. They were Delaware, Maryland, Virginia, Kentucky, Missouri, while North Carolina, Tennessee, and Arkansas were also frequently so designated. Of these, Virginia, North Carolina, Tennessee, and Arkansas seceded and joined the Confederacy.

BORDER WAR The war in Kansas between the "Sons of the South," or proslavery men, mostly from Missouri, and the "Free-State Men," mostly from the New England States, who had emigrated to Kansas for the purpose of excluding slavery therefrom. It continued for several years after the passage of the Kansas-Nebraska Act (q.v.) in 1854. *See* KANSAS. Consult, also, Eli Thayer, *A History of the Kansas Crusade* (New York, 1889).

BORDES, bôrd, CHARLES (1863-) A French organist and writer on music. He was born at Vouviay sur Loire and studied music under César Franck. After 1890 he was organist of St Gervais in Paris. In 1898 he founded the Schola Cantorum de St Gervais, which soon became famous for the masterly rendition of sacred choral works, notably those of Bach. He is the editor of the *Anthologie des maitres religieux primitifs*, and published *Archives de la tradition basque* (1890), a valuable study of Basque folk songs, and *Du sort de la musique religieuse en France* (1906). He composed a number of pieces for orchestra, a phantasy for piano and orchestra, piano compositions, and songs.

BORDIGHERA, bôr-dâ-gâ'ra A winter resort in the province of Porto Maurizio, Liguria, north Italy, on the Riviera, overlooking the Mediterranean, 91 miles southwest of Genoa and 7 miles from the French border (Map Italy,

B 4). It has beautiful villas, good hotels, and a splendid promenade, the Strada Romana, which runs through pine and olive groves on the high ground back from the sea. The situation is picturesque, the drinking water excellent, and the climate agreeable. Snow falls only occasionally, the average number of rainy days in the year is 45, of cloudy days 100, and the average winter temperature is 53° F. Bordighera is famous for its roses, carnations, anemones, palms, and its floriculture in general. There are an English church, a museum, and a theatre. It suffered severely in the earthquakes of 1887. Pop., 1881 (commune), 2556. 1901, 4673, 1911, 4229. Consult Miller, "Bordighera, Past and Present," in the *Westminster Review*, vol. cliv (London, 1900).

BORDONE, bôr-dô'na, PARIS (1500-71) A Venetian painter of the Renaissance. He was born at Treviso and came to Venice as a lad of eight. He was a pupil of Titian, but, dissatisfied with that master, worked independently, studying particularly the paintings of Giorgione. According to Vasari, he had much to suffer in his early career from the enmity of Titian. In 1535 he painted for the Scuola di San Marco the celebrated legend of 'A Fisherman Presenting the Ring of St Mark to the Doge,' now in the Venice Academy—one of the finest pageant pictures in Venetian art. Nevertheless he was excluded from the decorations of the ducal palace, to make room for inferior artists. He was active for some time in Treviso, where he frescoed the cupola of San Vincenzo, and at Ciema. At the invitation of Francis I he went to France in 1538, and there painted the portraits of the King and of many distinguished members of the court, returning to Venice in 1540, via Augsburg, where he painted in the Fugger Palace. Bordone's art resembles that of Palma Vecchio rather than that of his teachers. As a technician pure and simple he is one of the best of the Venetian school, particularly in his wonderful color. But his paintings are often devoid of content. He excels especially in portraits, but he also painted religious subjects, such as the "Last Supper," in San Giovanni in Bragora, Venice, and many mythological themes. He is well represented in the galleries of Venice, Milan, Florence, and Rome, also at Vienna, Dresden, Berlin, and London. The New York Historical Society possesses an example of his work. For the list of his paintings consult Berenson, *Venetian Painters* (New York, 1909), for his life and works, the exhaustive monograph of Bailo and Biscaro (Treviso, 1901), Cook, in *Burlington Magazine*, ix (1906).

BOR/DURE, or **BORDER** *See* HERALDRY. **BORE** (AS bôr, Ger *Bohr*, auger, gimlet, ME *boie*, Icel *bora*, hole) The interior of a gun. In the case of breech-loading guns the length of the bore is from the front face of the breech plug to the muzzle. It is also used in place of calibre, but, except in regard to shot-guns, this is not now very common. *See* ORDNANCE, GUNS, NAVAL, SMALL ARMS.

BORE (Icel *bora*, a billow caused by wind, Sw dial *bôr*, a mound), or **EAGRE** Names applied to the advancing wall of water caused by the incoming tidal wave in funnel-shaped bays and in the estuaries of certain rivers. The height of this rolling mass of surf increases towards the narrower part of the bay, and the wave is converted into a mass of roaring breakers that are the more pronounced in proportion as the bay

is shallower. When the water has reached the head of the bay, and its onward movement has been stopped by the resistance of the land, it remains for a short time as a high tide and then slowly and smoothly returns to the sea. The tidal range at the head of the Bay of Fundy exceeds 40 feet, reaching a maximum of 70 feet at the highest tide. The tidal wave causes an advancing breaker in almost every river. The bore in the estuary of the Tsien-Tang-Kiang may be mentioned as the most remarkable example of the phenomenon. The bore of the Amazon occasionally reaches a height of 16 feet. The rivers in India, especially the Ganges, are also celebrated for their bores. (See TIDES.) Consult Darwin, *The Tides* (Boston, 1898).

BOREAS (Gk. *Borēas*; cf. It. *bora*, Russ. *burja*, Bulg., Serv. *burra*, storm). The north or northeast wind, blowing toward Hellas from the Thracian Mountains, and personified in mythology as the son of Astræus and of Eos, or Aurora, and the brother of Notus, Zephyrus, and Eurus. Boreas was said to dwell near the Hyperboreans, in a cave of the Thracian Hæmus, to which he carried Orithyia, the daughter of the Athenian King Erechtheus, who bore him Zetes and Calais—employed as the symbols of swiftness—and Cleopatra, the wife of Phineus. According to Homeric fable, he begat, with the mares of Erichthonius, 12 horses of extraordinary fleetness. The rape of Orithyia, while she was gathering flowers on the banks of the Attic Ilissus, is said to have been represented on the chest of Cypselus at Olympia and is found on a number of red-figured vases, on an acroterion (q.v.) of the Temple of Athena at Delos, and on a fine bronze relief now in the British Museum. Boreas had a sanctuary in Athens and a festival called Boreasmos, for his help in wrecking the ships of Xerxes off Eubœa, and for similar reasons he was worshiped in Thuri and Megalopolis. His cult, however, was general, for Achilles prayed to him, and sacrifices were offered to him by the Ten Thousand Greeks, to say nothing of other allusions in the Greek writers. In art he is usually represented as a winged man of wild appearance, with rough, disordered hair and beard. On the Tower of the Winds at Athens (see ANDRONICUS CYRRESTES) he holds a Triton shell.

BOREGAT, bôr'e-gât. A name given to several rock trouts of the Pacific coast of the United States, especially *Hexagrammus stelleri*. See ROCK TROUT.

BORELLI, bô-rèl'la, GIOVANNI ALFONSO (1608-79). An Italian physicist and astronomer, the founder of the iatro-physical school. He was educated in Florence and was a professor of mathematics in Pisa and afterward in Messina. Having taken part in a revolt, he was obliged to leave Messina, and spent the remainder of his life in Rome. He carefully observed the motions of the satellites of Jupiter, then little known, and seems to have been the first to discover the parabolic paths of comets. In his epoch-making work, *De Motu Animalium* (1680-81; Eng. trans., *The Flight of Birds*, 1911), we find the first attempt to apply the principles of mechanics to the movements of animals. Regarding the bones as levers in which the power acts between the weight and the fulcrum, he endeavors to calculate the power of muscles from a consideration of their fibrous structure, and the manner in which they are united to the tendons.

BOBER. The hagfish (q.v.).

BORER. An animal that bores into the hard parts of other animals or plants, or makes tubular burrows. A tiny sponge of the genus *Cliona* perforates an oyster shell, one of these minute organisms inhabiting each perforation. The method of their action is yet a mystery; it is thought, however, to be both chemical and mechanical, i.e., by secretion and by spicules. Many worms are borers, working not only into the soil, but into sponges and like organisms. The crustaceans are said to bore, but this is an error; they burrow rather—e.g., the crayfish in search of water. One of the marine isopods, the gribble (*Limnoria lignorum*), however, is remarkable for the damage it does to wharves and other wooden structures in northern American harbors. But the most important borers are the mollusks, particularly the tereido (q.v.) and the family Pholadidae. A closely allied family (Gastrochamidae) have the same habit, the most important being the genera *Aspergillum* and *Gastrochama*. Lithodomus (see DATE SHELL) is another powerful borer. Lyell, in alluding to the alternate upheaval and submergence of the land on the coast, gives us the following fact: On the coast of the Gulf of Naples, near the ancient town of Pozzuoli, are three marble pillars rising 40 feet above the water, the remains of an ancient temple whose marble pavement still exists many feet below the surface of the bay. For a distance of 12 feet from the water these pillars are smooth and free from blemish. Then comes a distance of 9 feet, throughout which the marble is perforated with innumerable holes. At the end of each of these perforations may be found the remains of the tiny *Lithodomus*. The adjacent waters are still filled with the same species. There is a difference of opinion as to the precise manner in which bivalve mollusks bore, but there is little doubt that the foot and adductor muscles afford the motor power and the anterior part of the shell the cutting instrument. Among gastropod mollusks several small species are known as "borers" along the northern American coast, because of their method of perforating the shells of clams, oysters (resulting in serious annual loss to the oysterculturists), and similar victims. This boring of the shell is made with their rasp-like tongue ribbons, and through the perforation the juice of the victim is sucked out. The chief offender in Long Island Sound and New York Bay is *Urosalpinx cinerea*, commonly called drill. Insects of similar habits are described under BARK BEETLE; CARPENTER BEE; and similar titles.

BORGEHOUT, bôr'gêr-hout (Dutch *borg*, safety, security + *hout*, wood). A suburb of the city of Antwerp, Belgium (Map: Belgium, C 3). It contains diamond-cutting establishments, dyehouses, bleaching works, tobacco factories, and a church noted for its architectural beauty. Pop., 1900, 37,300; 1910, 49,333.

BORGHESE, bôr-gâ'sâ. A family of great distinction in the Republic of Siena and afterward in Rome.—CAMILLO BORGHESE (1650-1621) ascended the papal throne in 1605 as Paul V (q.v.) and by him other members of the family were advanced to high positions.—CAMILLO FILIPPO LUDOVICO, PRINCE BORGHESE (1775-1832), joined the French army when it invaded Italy and in 1803 married Pauline, the sister of Napoleon Bonaparte and widow of General Leclerc. His wife subsequently received the prin-

epality of Guastalla, and he was created Duke of Guastalla. He held his court in Turin and was very popular among the Piedmontese. He sold the Borghese collection of artistic treasures to Napoleon for 13,000,000 francs, receiving in part payment the Piedmontese national domains, but when these were reclaimed by the King of Sardinia, in 1815, he received back some of the works of ancient art. The remainder are in the Louvre. After the overthrow of Napoleon he separated from his wife and broke off all connection with the Bonaparte family. He lost Guastalla, but retained the principalities of Sulmona and Rossano, his hereditary possessions. His heir was his brother, Francesco Borghese, Prince Aldobrandini (1778-1839), a general in the French service, who was succeeded by his eldest son, Marco Antonio (1814-86). Of the latter's two sons, the elder, Prince Paolo, born in 1845, lost through unlucky speculations the greater part of his fortune, in consequence of which most of the precious collections of the family had to be sold at auction in 1891-92. The valuable family archives were acquired by Pope Leo XIII for the Vatican. By negotiations subsequently concluded the art treasures of the palace became the property of the Italian government.

BORGHESE, VILLA. The summer palace of the Borghese family, situated outside the Porto del Popolo, Rome, in an extensive garden, ornamented with artificial ruins and fountains. It was built by Cardinal Scipio Borghese, nephew of Pope Paul V, on the Cenci estate. Many of its former treasures of ancient sculpture were removed to Paris in 1806.

BORGHESE GLADIATOR. A work of Agassias (qv) of Ephesus, formerly in the Borghese collection in Rome, whence the name. By order of Napoleon it was sent to the Louvre, in Paris, where it now is. It belongs to the first century B.C.

BORGHESE MARS. A fine example of ancient sculpture once in the Borghese collection in Rome, now in the Louvre, Paris.

BORGHESI, bôr-gâ'sê, BARTOLOMEO (1781-1860). An Italian numismatist and epigraphist, born at Savignano, near Rimini. His earliest studies were on documents of the Middle Ages, afterward he turned his attention to Roman numismatics and epigraphy. During the troubled times of 1821 he retired to the little Republic of San Marino, where he made his home until his death. He arranged and catalogued the coins in the Vatican. By his publication *Nuovi Frammenti dei Fasti Consolari Capitoli* (2 vols., 1818-20), Borghesi established himself as one of the most eminent epigraphists of modern times, indeed, he may be called one of the founders of present-day epigraphy. The design of publishing a collection of all ancient Roman inscriptions, conceived by Borghesi, was carried into effect through the influence of Mommsen (qv), the result was the monumental *Corpus Inscriptionum Latinarum*. His writings were very numerous. After his death a collected edition of them, begun at the order of Napoleon III, was published under the title *Œuvres complètes* (10 vols., 1862-97).

BORGIA, bôr'ja. An Italian family of Spanish origin which acquired great eminence after the elevation of Alfonso Borgia to the papacy as Calixtus III in 1455. He had previously been a counselor of the King of Aragon. He died in 1458.—RODRIGO BORGIA, nephew of the fore-

going, ascended the papal throne in August, 1492, under the name of Alexander VI (qv). Before his elevation to the papacy he had a number of children by a Roman woman named Vanozza (Giovanna de' Catanei), of whom the most celebrated were Cesare and Lucrezia.—CESARE or CESAR BORGIA was one of the most noted men of the times, and his character, like that of his father, has been the subject of much historical controversy. He had early received high ecclesiastical preferment, and his father, soon after becoming Pope, made him Cardinal. The assassination of his brother Giovanni, Duke of Benevento and Count of Terracina and Pontecorvo, has been laid to Caesar's charge, but with no evidence save that Caesar succeeded him. He obtained the duchy and counties for himself and was permitted by his father to resign the purple and to devote himself to the profession of arms. He was sent, in 1498, to France, to convey to Louis XII a bill of divorce from his consort Jeanne, on the ground of no consummation. Louis rewarded him, in his royal gratitude, with the Duchy of Valentinois, a bodyguard of 100 men, 20,000 livres of yearly revenue, and a promise of support in his schemes of ambition. In 1499 Caesar married a sister of the King of Navarre and accompanied Louis XII to Italy, where he undertook the conquest of the Romagna for the Holy See. But before the conquest was completed, Caesar was compelled to desist on account of the defeat of his French allies in the northern part of Italy. In 1501 he was named by his father Duke of Romagna. In the same year he wrested the Principality of Piombino from Jacopo d' Appiano, but failed in an attempt to acquire Bologna and Florence. He took Camerino and caused Giulio di Varano, the lord of that town, to be strangled along with his two sons. By treachery as much as by violence he made himself master of the Duchy of Urbino. A league of Italian princes was formed to resist him, but he kept them in awe by force until he succeeded in winning some of them over by advantageous offers, employed them against the others, and then treacherously murdered them on the day of the victory (Dec. 31, 1502) at Singaglia. He now seized their possessions and seemed to have removed every obstacle in the way of becoming King of Romagna and of Umbria, when, on Aug. 17, 1503, his father died, probably of malaria, though at the time there were rumors of poison. Caesar, also, who was a party to the design, had himself partaken of the poison, and the consequence was a severe illness. Enemies rose against him on all hands, and one of the most inveterate of them ascended the papal throne as Julius II. Caesar was arrested and conveyed to the castle of Medina del Campo, in Spain, where he lay imprisoned for two years. At length he contrived to make his escape to the King of Navarre, whom he accompanied in the war against Castile, and was killed on March 12, 1507, by a missile from the castle of Biano. With all his intrigue and cruelty, Borgia was temperate and sober. He loved and patronized learning and possessed in a remarkable degree a ready and persuasive eloquence. Machiavelli, who was at one time dazzled by the energy and ability of Caesar and believed that he was capable of unifying Italy, has delineated his character in his *Prince*.—LUCREZIA BORGIA, sister of Caesar Borgia, a woman of great beauty, was born in Rome in 1480. She was married first to Giovanni Sforza, Lord of

Pesaro, June, 1493; but her father, on the ground of her husband's impotence, annulled this marriage (Dec. 20, 1497) and gave her (June 20, 1498) to Alfonso, Duke of Bisceglie, nephew of the King of Naples. Alfonso, believing that Cesar had sought his life, attempted to retaliate and was in turn cut to pieces by his own bodyguard at Cesar's command. For the third time free, the Pope's daughter became, in spite of the repugnance of the Duke Ercole d'Este, the wife of the latter's son, Alfonso, who soon after inherited the Duchy of Ferrara. Lucrezia has been represented as placed outside the pale of humanity by her wantonness, her vices, and her crimes, but the recent researches of most accurate and impartial historians have refuted the more extravagant of these assertions. She died June 24, 1519.

Bibliography. For a general view of the Borgias the best Protestant presentation is W. Creighton, *History of the Papacy* (7 vols., London, 1887). For the best Catholic presentation consult Pastor, *Geschichte der Papste* (Eng. trans., "History of the Papacy," 3 vols.). For Cesar Borgia, consult Yriarte, *César Borgia* (Paris, 1889), and Woodward, *Cesare Borgia* (London, 1913). For Lucrezia Borgia, consult Gregorovius, *Lucrezia Borgia* (Stuttgart, 1875). Consult also Corvo, *Chronicles of the House of Borgia* (New York, 1901); Mathew, *Life and Times of Rodrigo Borgia, Pope Alexander VI* (New York, 1912); Fyvie, *Story of the Borgias* (New York, 1913).

BORGIA, FRANCISCO (1510-72). A general of the Jesuit Order, born at Gandia, Valencia. His early life was spent at the court of Charles V and in 1545, after his wife's death, he entered the Order of Jesus and was appointed by Loyola vicar-general of the order in Spain and Portugal. This position he held until the death of Lainez, whom he succeeded as the third general of the order. He instituted reforms in the society and so greatly promoted its progress that he is sometimes spoken of as its second founder. He was canonized in 1671.

BORGIA, STEFANO (1731-1804). An Italian antiquarian and prelate, born at Velletri. In 1759 he was appointed papal governor of Benevento, and in 1764, by precautionary measures, protected the city and district against an impending famine. He became secretary of the Propaganda in 1770, Cardinal in 1789, and in 1801 rector of the Roman College. He was well known for his valuable archaeological collection, to which admission was freely granted to scholars, and from which, it is said, he once sold a gold plate to defray the expense of imprinting San Bartolommeo's *Systema Brahmanicum*. He wrote *Memorie storiche della pontificia città di Benevento dal secolo VIII al secolo XVIII* (3 vols., 1763-69).

BORGLUM, GUTZON (JOHN GUTZON DE LA MOTHE) (1867-). One of the most prominent of American sculptors, and also a painter; brother of Solon Borglum. He was born in Idaho, March 25, 1867, the son of a Danish woodcutter, who later became a physician. He received his early education in the public schools of Fremont and Omaha, Neb., and in St. Mary's College, Kans. He first studied painting in the San Francisco Art Academy under Virgil Williams and William Keith, and from 1890 to 1893 he studied painting and sculpture in the Académie Julian and the Ecole des Beaux-Arts, Paris. In the latter year he returned

to California, removing to London in 1895. From 1896 to 1901 he exhibited both painting and sculpture in Paris and London, and was elected to the Royal Society of British Artists and to the Société Nationale des Beaux-Arts. In 1902 he established his residence in New York. The two principal influences in his very original art are Rodin in sculpture and Whistler in painting. To an able technique he adds a vivid imagination; his work always embodies an emotion or ideal. Among his principal works in sculpture are: "Pursued," two youthful figures upon horseback (in possession of the Kaiser); "The Boer," an equestrian figure; the "Mares of Diomedes" (Metropolitan Museum), an original and brilliant work; the small and characteristic figures of John Ruskin (Metropolitan Museum), and Nero; a number of highly original gargoyles for Princeton University; a statue entitled "I have piped and ye have not danced" (1905); and a series of statues for St. John's Cathedral, New York. The most important of his later works are at Washington, D. C.: a group entitled "North America" and a bas-relief for the building of the Bureau of American Republics; the Sheridan Monument, the statue of James Smithson, and the colossal head of Lincoln in the rotunda of the Capitol. His paintings include "Captive Pan," "Abandoned," "Iago and Cassio," and mural decorations in Leeds and Manchester, England.

BORGLUM, SOLON HANNIBAL (1868-). A distinguished American sculptor. He was born at Ogden, Utah, Dec. 22, 1868, and spent his youth in Fremont, Neb., and his early manhood on a cattle ranch. At the age of 24 he turned to art, spent two years with his brother Gutzon in California, and in 1895 entered the art school of Cincinnati. His first group, a "Horse Pawing a Dead Companion," won a special prize, and in 1897 he won a scholarship which brought him to Paris. There he studied under Louis Rebisso and Frémiet. He achieved honorable mention with his "Lame Horse" in the Salon of 1899, and attracted much attention by the originality of his subjects, taken from the life of the western frontier, which he himself had experienced. His art has perpetuated the life of the cowboy, ranchman, Indian, and the animals, particularly the horses, of the plains, with truth and inspiration, and shows little French influence, even in technique. After 1900 he was active in New York. He became an associate of the National Academy and a member of the National Sculpture Society. Among his principal works are a "Stamped of Wild Horses" (Cincinnati Museum), "The Last Roundup," "On the Borders of White Man's Land" (Metropolitan Museum), "Burial on the Plains," "Tamed," "Just Born," "Evening," and "The Bucking Broncho." His later works include the equestrian statues of Gen. J. B. Gordon (1907, Atlanta, Ga.), and Captain O'Neill (1907, Prescott, Ariz.); a number of portrait busts, including those of ex-Mayor Schieren of Brooklyn and Simon Newcomb; portrait reliefs such as that of Brig. Gen. Joseph A. Mower (Vicksburg Battlefield); and "Private Jones of the Confederate Army," a bronze statue in Lynchburg, Va.

BORGNE (börn), **LAKE**. An inlet of the Gulf of Mexico extending into the southeast of Louisiana and covering an area 60 miles long by 10 broad (Map: Louisiana, F 3). It is con-

nected by Rigolets Pass with Lake Pontchartrain and is used by steamers plying between New Orleans and Mobile

BORGIO, Pozzo di See Pozzo di Borgo

BORGOGNONE, bôr'gô-nyô'nâ, AMBROGIO, also called AMBROGIO DA FOSSANO, or IL BORGOGNONE (c1445-c1523). An important Lombard painter of the Renaissance. He was born probably at Fossano, and first appears in 1481 as a master in the "University of Arts" at Milan. His earliest work shows the influence of Vincenzo Foppa, whom he imitates, and, in certain details, of Butinone. To his early period, usually called his "gray manner," belongs the most important commission of his life—a series of panels and decorations for the Certosa di Pavia, where he labored seven years. Among surviving altarpieces of this series are "The Crucifixion," with intense but reserved expression of grief, and harmonious color; the grandiose and majestic altar of St Ambrose, the altar of St Siro. The principal decorations were the colossal frescoes of the vault of the apse representing Gian Galeazzo Sforza offering the model of the Certosa to the Madonna, and the "Coronation of the Virgin," with figures of Dukes Francesco Sforza and Ludovico il Moro, in these he was assisted by his younger brother Bernardo. In his later period Borgognone's style becomes more personal, especially in form, as is shown in the elongated figures. More than any other painter of the day he held aloof from the prevailing influence of Leonardo, retaining the mild and pious ideals of old Lombard art. His most important works of the later period are the frescoes of San Sattiro, Milan, now in the Brera (1495), "The Coronation of the Virgin" (1498), in Santa Maria Incoronata at Lodi, and four other incidents of her life, and the greatest of all his paintings, the imposing fresco of the "Coronation of the Virgin," in the apse of San Simpliciano, Milan, executed shortly before his death. Consult his biography by Bona (Fossano, 1897). The chief authorities on Borgognone are Beltrami and Zappa, whose articles have appeared in various Italian publications.

BORGU, bôr-gô' A kingdom in the Sudan (q.v.), west of the Niger, and bounded by the states of Gurma and Gando on the north and Chanjo on the south. The country is generally level, and the soil is fertile. The population is composed of pagan negro Bariba, Fulahs, etc. The principal settlement is Bussa, on the Niger. Near Bussa Mungo Park met his death. At the demarcation of the western boundary line of Nigeria in 1885-86 the eastern part of Borgu was included in the British possession of Northern Nigeria, and the western in the French colony of Dahomey (q.v.). Consult "The Struggle for Borgu," in *Blackwood's Magazine*, No 65 (London, 1899).

BORIC or **BORACIC ACID** (from *boron*, or *borax*), H_2BO_3 . A soluble, solid substance crystallizing in the triclinic system and known mineralogically as *sassolite*. It is found in the waters of the Tuscan lagoons of Monte Rotondo, Castelnuovo, and elsewhere, also as an incrustation on sulphur in the crater of Vulcano in the Lipari Islands, it has been found in the form of borates in the borax lakes of California. It is also found native (See BORON). It was extracted from borax by Homberg in 1702 and became known as "Homberg's sedative salt." In 1774 Hôfer, a Florentine apothecary, discovered its presence in the lagoons of Tuscany

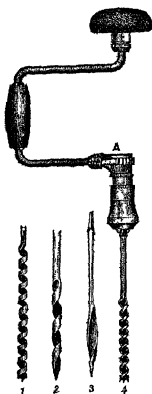
—the principal source of supply. The acid is obtained by passing the hot vapors from the lagoons through water, in which the acid dissolves. At present part of the boric acid of commerce is derived from borax and from the minerals boracite and sodium-borocalcite. Boric acid is a white translucent crystalline compound, readily soluble in water, alcohol, and other liquids. Besides its use in the production of borax, it is employed for glazing porcelain, in the manufacture of glass and certain pigments, and in preparing the wicks of stearine candles. At $106^\circ C$ boric acid changes into meta-boric acid, HBO_3 , at $160^\circ C$ it changes into pyro-boric acid, $H_2B_2O_5$, and at a red heat it changes into boric oxide, B_2O_3 .

Boric acid or borax used in food experimentally has caused indigestion and vomiting. It has produced kidney disease in animals. Used in open wounds it has caused vomiting, delirium, and death. It is a questionable, if not dangerous, preservative of food. Boric acid is a mild, non-irritating, and slightly astringent antiseptic, and as such is extensively employed in medicine. Solutions of it are particularly grateful to the mucous membranes, and therefore may be used as an eyewash, as a nasal douche, or to irrigate the bladder, or to cleanse the mouth in cases of aphthous stomatitis. It is a safe domestic remedy, since it is only moderately soluble in water (1-256) and hence not apt to be used in excessive strength.

BORING TOOLS AND MACHINERY
The simplest implement for boring holes in wood is the awl, which displaces the fibres of the wood and leaves a hole without removing the wood

to any great extent. For boring small holes of larger size than can be easily bored with awls, gimlets are employed. A gimlet has a conical screw point followed by a spiral groove for clearing the hole and is fitted with a wooden or metal cross handle or with a square shank for insertion into a bitstock or brace. For boring larger holes than can be bored with gimlets, augers and bits are employed. These tools are too familiar to require description. Bits and augers are operated by hand by means of bit braces or bitstocks, or by some simple mechanism operated by power. In recent years pneumatic boring machines have come into extensive use for wood boring in car-shops, shipyards, and other places where large amounts of heavy boring are done. These machines are fully described under PNEUMATIC TOOLS. In boring holes in metal and rock the drills used are different from those employed in wood working, they will be found described under METAL-WORKING MACHINERY AND DRILLS.

BORIS GODUNOFF, bô-rës' gô'du-nôf' A



BRACE AND BITS

1, Ring bit, 2, 3/4 inch gimlet bits, 4, auger bit, A, ratchet brace

play by Pushkin based on the life of the Russian ruler of that name. See GODUNOFF.

BORIS GODUNOFF. An opera by Moussorgski (q.v.), first produced in St. Petersburg, January 24, 1874; in the United States, March 19, 1913 (New York).

BORISLAV. See BERISLAV.

BORISOVKA, bô-ré'sôf-ka. A town in the government of Kursk, Russia, situated about 120 miles south of the town of Kursk. It has a considerable tanning industry and holds five fairs annually. In the vicinity is situated the Tikhvin-Borisov Convent, founded by Count Sheremetiev in the eighteenth century, and the house which Peter the Great occupied during the war with the Swedes. Pop., 1897, 16,400.

BORISSOGLEBSK, bô-ré'sô-glêpsk' (in honor of the two canonized princes, Boris and Glib). The capital of a district in the government of Tambor, Russia, on the left bank of the Vorona, 110 miles southeast of the city of Tambor, and 424 miles southeast of Moscow (Map: Russia, F 4). It is an active commercial town, with good harbor, and contains, among other educational institutions, a school for railway mechanics. Borissoglebsk is in direct communication with ports on the Sea of Azov and Black Sea by means of the waterways of Vorona, Khoper, and the Don, and is connected by rail with Tzaritzin and the territory on either side of the Volga, on the one hand, and with the ports on the Baltic on the other. Grain, timber, kerosene, fish, caviar, watermelons, for St. Petersburg and Moscow, and salt from the lakes of Astrakhan, pass through Borissoglebsk. Rafts and barks are built here annually and are laden with goods for Rostov and Taganrog. Borissoglebsk was founded in 1646 for defense of the frontiers against the incursions of the Crimean Tatars. Pop., 1885, 13,000; 1897, 22,370.

BORISSOV, bô-ré'sôf. The capital of a district in the government of Minsk, Russia, on the Beresina, 50 miles northeast of Minsk, near the place where Bonaparte's army crossed the river Borisov in 1812 (Map: Russia, C 4). There is trade in cattle and grain, and flour mills, breweries, and tobacco factories are the chief industrial establishments of the town. Borissov is known to have existed in the twelfth century and came into the possession of Russia in 1795. Pop., 1897, 14,931, including about 10,000 Jews.

BÖRJESON, bër'ye-son, JOHAN HELENUS LAURENTIUS (1836-1910). A Swedish sculptor. He was born in Tolö, Holland, and studied in Rome and Paris until 1879, when he returned to Stockholm. In 1882 he was appointed associate, and in 1886 full professor, in the academy at Stockholm. His works include genre and ideal subjects, and portrait statues of various sizes. The following are among the principal ones: "The Bowler" (Göteborg Museum); "Youth with a Tortoise" (National Museum, Stockholm); the colossal statues of Holberg at Bergen, of Axel Oxenstierna in the House of Lords, Stockholm, and of King Charles X. Gustavus at Malmö (1896), his masterpiece, and the equestrian statues of Magnus Stenbock (1901, Helsingborg) and Charles IX (1904, Göteborg). His works vary in quality, but the best are full of energy and strength.

BÖRJESSON, bër'ye-sôn, JOHAN (1790-1866). A Swedish poet and dramatist, born in

the parish of Tanum. He studied theology at the University of Upsala and in 1828 became pastor of Weckholm. He published two volumes of poems, *Karlels och goesi* (1849) and *Blommor och tårar på en dotters graf* (1854); but his reputation came first with his tragedies, clearly under the influence of Shakespeare. Of these, *Erik den Fjortonde* ('Erik the Fourteenth,' 1846) is his best, accessible in the German rendering of Winterfeld (1855). His collected works were edited by Dietrichson (Stockholm, 1873-74).

BORLAND, SOLON (1811-64). An American soldier and politician. He was born in Virginia, but early removed to Arkansas. He served as major of volunteers during the Mexican War, was in the United States Senate from 1849 to 1853, and in 1853-54 was Minister to Central America. While returning to the United States (1854), the inhabitants of Greytown tried to arrest him for having aided an accused person, and, by order of the United States government, the town was bombarded by Commander Hollins. In the spring of 1861, before his State had seceded, he organized a body of troops, and, in the name of the Southern Confederacy, took possession of Fort Smith, Ark. Later he was made a brigadier general in the Confederate army.

BORLASE, bôr'las, WILLIAM (1695-1772). An English antiquary, born at Pendeen. He graduated at Exeter College, Oxford, and in 1720 was ordained priest. In 1722 he became rector of Ludgvan, and in 1732 he received the vicarage of St. Just. He was a close student of the antiquities and natural history of Cornwall, and published as the first result of his researches the essay on *Spar and Spary Productions* (1750). His most important work was his *Antiquities of Cornwall* (1753)—a collection of learned and original essays, followed in 1756 by *Observations on the Ancient and Present State of the Islands of Scilly, and their Importance to the Trade of Great Britain*. He published, in 1758, a *Natural History of Cornwall*. He was a friend of many contemporary men of letters, including Pope, for whose Twickenham grotto he supplied most of the mineral and fossil decorations.

BORMANN, bôr'mân, EDWIN (1851-1912). A German poet and song writer. He was born in Leipzig, and educated at the Polytechnic School, Dresden, and the universities of Leipzig and Bonn. His first literary work was a series of humorous sketches in the Saxon dialect, contributed to the *Fliegende Blätter*. He is also the author, in High German, of a book of humorous songs, entitled *Seid umschlungen Millionen* (1879), and also of *Schelmeheder* (1883); *Das Buchlein von der schwarzen Kunst* (1886); *Liederhort in Sang und Klang, in Bild und Wort* (1888), *Klingsinsland* (1891); *Das lustige Buch* (1900); *Ut de Franzosenlîd*, a comedy (1905). After 1894 he published several books in defense of the theory that Shakespeare's works were really written by Francis Bacon.

BORMANN, bôr'mân, EUGEN (1842-). A classical philologist, professor of ancient history and epigraphy in Vienna, author of *Pastorum Civitatis Tauromenitanæ Reliquiæ Descriptæ et Editæ* (1882); *Inscriptiões Emilieæ Etruriæ Umbriæ Latine* (1888). He is also a corresponding member of the Imperial Academy of Sciences, Vienna, and was one of the assistant editors of the *Corpus Inscriptionum Latinarum*. In 1885 he wrote with O. Benndorf

the *Archäologisch-epigraphischen Mittheilungen des Oesterreich-Ungarn*

BORMIO, bôr'mê-5 (Ger Worms). An antiquated town in the province of Sondrio, north Italy, 4020 feet above the sea, in the upper valley of the Adda, at the south entrance of Stelvio Pass (q.v.) (Map Italy, E 1). The nearest railway station is at Sondrio, 44 miles to the southwest, which is 25 miles east of Colico, on Lake Como. Two miles northwest of Bormio are the New Baths (Bagni Nuovi di Bormio), 4380 feet above the sea. They are supplied through pipes by springs, some 400 feet higher, which were mentioned by Pliny and by Cassiodorus. The baths are frequented by tourists, especially during July and August. The old Roman baths (*piscinae*) hewn in the rock can still be seen. Pop. 1881 (commune), 1800, 1901, 1814, 1911, 2126. Consult Kilha, *Rhätische Kurorte und Mineralquellen* (Chur, 1883).

BORN, bôrn, BEERTRAND DE (1140-1215). A French soldier and troubadour. He was born at the castle of Born in Perigord. He fought with his brother for the family possessions and defeated him. But Richard I sided with his brother and deprived Born of them. He is generally represented as a breeder of dissensions and especially as embittering the strife between Henry II of England and his sons. Dante refers to this in the *Inferno* (xxviii). Late in life Born entered the monastery of Dalon, and is supposed to have joined the Cistercian Order. He wrote some poems of love and war which breathe a spirit of passion. There are two editions of his works edited by Albert Stimming (Halle, 1879) and A. Thomas (Toulouse, 1881). Consult for an interesting but not entirely trustworthy account, Hewlett's novel, *Richard Yea-and-Nay* (1900), E. Magne, *Bertrand de Born* (Paris, 1904), R. de Baysson, *Etudes sur Bertrand de Born* (Paris, 1902).

BORN, bôra, IGNAZ VON (1742-91). An Austrian mineralogist and metallurgist, born in Karlsburg, Transylvania. He studied law in Prague and went into the Department of Mines there in 1770. In 1776 he went to Vienna and took charge of the Imperial mineralogical collections. Against much opposition he succeeded in substituting amalgamation for smelting and cupellation for extracting silver from the ores in the mines of Hungary, and also introduced other practical improvements in mining, salt working, and chemical bleaching. His works include *Ueber das Anquellen der Erze* (1786), *Lithophylacium Bornanum* (2 vols., 1772-75), *Bergbaukunde* (2 vols., 1789-90), and satires against the Jesuits.

BORNE, bôr'ne, LUDWIG (1786-1837). A German political pamphleteer and satirist, born in Frankfurt-on-the-Main, son of a Jewish banker. According to his father's wishes he studied medicine at Berlin, Halle, and Heidelberg, where he turned rather to political economy and the science of government, which latter studies he also continued at Gießen. After a few years' work as a government official in Frankfurt he began his career as an author with several pamphlets in the interest of the Frankfurt Jews. Already estranged for some time from his kin, he renounced his Hebrew faith and name, Lob Baruch, in 1818. He then published various political journals that were successively suppressed, of which the best known is *Die Wage*—*Blätter für Bürgerleben, Wissenschaft und*

Kunst (1818-21). He was an able and caustic critic of the political condition of Germany, and after the *Wage* was discontinued (1821), led a restless life in Paris, Heidelberg, Frankfurt, Berlin, and Hamburg. After the July Revolution he returned to Paris (1830), where he reestablished *Die Wage* under the French title of *La Balance*, for the purpose of promoting a closer intellectual union between France and Germany. He is now best remembered for his dramatic criticism and for a bitter controversy with his fellow exile Heinrich Heine. His collected *Works* (12 vols.) appeared in 1863. His best-known satire is *Maximal der Franzosenfresser* (1837). His *Denkrede auf Jean Paul* (1826) is famous for its beauty of thought and style. Consult Heine, *Ueber Borne* (Hamburg, 1840), Holzmann, *Leben Bornes* (Berlin, 1888), Bundes, *Das Junge Deutschland* (Leipzig, 1890), L. Geigier's editions of his *Berliner Briefe* (Berlin, 1905), and *Bornes Briefe an Henriette Herz* (Oldenburg, 1905).

BORNEENE. See BORNEOL.

BORNEIL, bôr'nâ'y, GRAUD DE. A French poet belonging to the close of the twelfth century. He was born at Exideuil (Dordogne) and won high rank for his verses. Mention is made of him in the *Purgatory* by Dante, who also, in the *De Vulgari Eloquio*, classes him with Arnaut Daniel and Bertrand de Born. His patrons included Richard I of England (Cour-de-Lion), Alfonso VIII of Castile, and Pedro II of Aragon. Of his work there have been preserved 82 specimens, many satiric, most of them obscure.

BORNEMANN, bôr'ne-man, FERDINAND WILHELM LUDWIG (1798-1864). A German jurist and statesman. He was born in Berlin and studied jurisprudence there. In 1843 he became Minister of Justice in the Camphausen ministry, and in the same year second president of the Superior Court at Berlin. In 1849 he was elected to the First Chamber of the Prussian Diet, and in 1860 he became a member of the House of Peers. He is known as one of the most eminent authorities on Prussian civil law, of which his *Systematische Darstellung des preussischen Civilrechts* (6 vols., 1834-39) was the first adequate presentation. He also wrote *Die Rechtentwicklung in Deutschland und deren Zukunft* (1856).

BORNEO (corrupted from *Brunei*, Malay *Burni*, *Burni*, a district, the island having no comprehensive native name, though sometimes called *Pulo Kalamantan*, after one of the native fruits). The third largest island in the world, only Greenland and New Guinea exceeding it in area (Map East Indies, D 4). It is situated in the East Indian Archipelago between 7° 3' N and 4° 10' S lat and 108° 53' and 119° 22' E long. It is bounded on the north by the South China and Sulu seas, the latter separating it from the Philippine Islands, on the east by the Celebes Sea and Strait of Macassar, which separate it from Celebes, on the south by the Java Sea, which separates it from the island of Java, and on the west by the southern part of the south China Sea, which separates it from Malacca and Sumatra, and by Karimata Strait. It is 780 miles long and 690 miles wide, has an area of 293,500 square miles, a length of coast line of about 3230 miles, and its population is estimated (Meyer) at 1,737,000. The interior of the island is still inadequately explored, but some of its leading features are known more

or less definitely. Extending in a generally northeast direction from Kendawangan near the extreme southwest of the island to the neighborhood of Labuk Bay on the northeast coast are mountain ranges usually closely connected but bearing different names, as the Schwaner, Muller, and Iran mountains. This line of highlands forms the largest water-parting between the drainage systems of the island, the rivers to the west of it reaching the sea on the west coast and those to the east of it on the east or southeast coasts. About two-fifths of the island lies to the west and three-fifths to the east of this natural dividing line. In the central part of the island and on this line of ranges is Batoe Tiban, a mountain 5617 feet high, which may be called the nucleus of mountain systems radiating to the west, east, and southeast, the other two limbs of these radiating ranges being the ranges above referred to as crossing the island in a northeast to southwest direction. The island is thus divided by these radiating highlands into six drainage areas, in most of which are a considerable number of distinct river systems.

None of the mountains attains great elevation. The highest summit is the granite Mount Kinabalu (13,700 feet) in the northwest part of the island. It is the giant among the mountains of the entire archipelago. The Schwaner Mountains form a highland of from 3300 to 6000 feet in height. The Iran Mountains are the dividing line between the British territory of Sarawak and Brunei in the west and the Dutch district Tidoeng in the east. In the west are a few small volcanic cones, but the island has no active volcanoes.

Borneo stands upon a submarine plateau of no great depth. Its coasts, on the whole, are flat and marshy. The rainfall being heavy, the rivers are numerous. Those of the territory of British North Borneo are of little importance, because the mountains they cross are near the coasts, so that the rivers fail to afford navigable connections with the sea. All other parts of the island are well supplied with useful waterways, and the greater part of the population live near them. Two important rivers, the Baram and the Rejang, and many smaller streams drain the territory of Sarawak. All the other leading rivers are in Dutch Borneo, the northeastern division being drained principally by the Balungan River, or Batang Kayan, the southeastern by the Kotei and Banjarmasin rivers; and the southwestern by the Kapuas, which is the largest of all the rivers, having a course of about 700 miles from the centre of the island to its southwestern side. While the intersection of the two principal mountain chains is very nearly in the centre of the island, the southern half of it is so much wider than the northern that the southern rivers have much longer courses and therefore are serviceable to much larger areas. It is also important to note that all these rivers have their sources not far from the intersection of the two principal mountain chains near the centre of Borneo—the Batang Kayan, flowing east-northeast, the Kotei southeast by east, the Banjarmasin south, the Kapuas a little south of west, the Rejang west, and the Baram north-west. The movement of the population has always chiefly followed these highways.

All the larger rivers are navigable by small steamers for many miles above their mouths; thus a large steam launch can ascend the Rejang for 160 miles, the Baram for 120, and some of

the rivers on the Dutch side for still greater distances.

The land adjoining nearly all of the coast is a belt of low-lying swamp consisting of alluvium brought down by rivers from the central islands. In many places this belt of alluvium is 50 miles wide and is especially extensive in the south and southeast of the island. Between the swampy coast belt and the mountains is a zone of irregular hill country, with an average height of about 1000 feet above the sea, peaks occasionally rising to 5000 feet or more.

The coast of Borneo is, in the main, indented only by open bays. It has a considerable number of islands, the chief of which are Labuan on the northwest coast, Banguey on the north coast, Laot on the southeast coast, and Maivang on the southwest coast.

While the geology of Borneo is very imperfectly known, it may be said that the mountain ranges forming the backbone of the island are mostly crystalline schists, slates, sandstones, and limestones. The low-lying country between the mountain ranges is largely covered by Tertiary and Quaternary deposits. Economically the most important formations are the coal deposits of the Tertiary period, and they show the remains and much of the detailed structure of the luxuriant vegetation of this period. The chief products of the rich mineral deposits are gold, diamonds, silver, platinum, mercury, tin, and antimony, to which must be added petroleum, sulphur, rock salt, marble, rock crystal, and porcelain clay. Most of the streams appear to be auriferous.

At a comparatively recent date Borneo was probably continuous with the mainland of Asia. The submarine bank upon which it stands is nowhere more than 600 feet below the surface. That the separation was effected in a recent geological period seems to be shown by the presence in Borneo of many Asiatic mammals, such as the rhinoceros, elephant, wild cattle, several species of deer and pig, the tiger cat, numerous bats, squirrels, and two of the anthropoid apes which are incapable of crossing even narrow channels of water and must be regarded as related to the anthropoids whose fossil remains have been discovered in Asia.

The climate of the island is warm, moist, and very equable. The rainfall is copious throughout the year, but heaviest during the northeast monsoon from October to February, and least in April and May. At Kuching the average annual rainfall for 30 years has been 160 inches, the maximum 225, and the minimum 102 inches. The greatest rainfall recorded in one day was 15 inches. The temperature ranges between 70° and 90° F. and rarely reaches 100° F. Snow and frost are unknown except occasionally on the tops of the highest mountains. The climate is, however, trying on account of the great humidity of the air. There is no actually dry period, such as occurs farther from the equator, except for accidental droughts. The lowland climate is unhealthful for Europeans. The winds partake of both trade and monsoon characteristics.

The rich fauna of Borneo belongs to the Malayan subregion of the Oriental region of Wallace and indicates past connection with the continent. Of the mammalia, the most typical are the apes and monkeys (the orang-outang and proboscis monkey), the elephant, rhinoceros, and tapir in limited areas, the honey bear, wild cattle, wild pigs, deer (especially the "mouse

deer"), flying lemurs, the feather-tailed tree shrew, and several members of the cat family. Birds are numerous. The avifauna includes, among other birds, various hornbills, the argus pheasant, and the edible-nest swallow. Snakes are common, and in the waters of the lower regions dangerous crocodiles abound. The coast and inland waters abound in fish, some of which are dried and form an article of export. Butterflies are very numerous and exceedingly beautiful, beetles, while abundant and of many species, are not so prominent. Insect pests are very annoying, mosquitoes and sand flies in the air, fire ants on the ground, and leeches in the waters.

Practically the whole of Borneo, from the sea-coast to the summits of the highest mountains, is covered with dense forest. The vegetation of Borneo is rich in species and luxuriant in growth. In the flooded regions the vegetation consists of tangled and matted reed and bush growth, which presents a marked contrast to the forests of the adjacent dry lands. Upward of 50 kinds of trees furnish timber, among them are the mohor, tappau, ironwood, ebony, sandalwood, and teakwood. Various trees furnish saps, gums, and resins, such as gutta-percha, camphor, and dragon's-blood. Numerous palms flourish, among others the useful fan, coconut, and sago palm. Spices, nuts, and numerous tropical fruits are produced in profusion. Sugar cane, cotton, and tobacco are cultivated extensively. In the mountain region rhododendrons grow in profusion, and ferns, orchids, and clinging plants are common, the huge pitcher plants, deserving special mention.

Politically Borneo is divided into British Borneo and Dutch Borneo, the two being separated by the mountain barrier which extends from the central west coast in a northeasterly direction nearly across the island. British Borneo consists of the state of North Borneo, Brunei, and Sarawak. The state of North Borneo occupies the northern part of the island, and extends from the Sipitong River, which flows into Brunei Bay, on the northwestern coast, to the shore of St. Lucia Bay, on the northeastern coast, in 4° 10' N lat. It has an area of 31,106 square miles and a coast line of about 900 miles. The inhabitants are mainly Bruneis, Ilanuns, Bajaus, and Sulus on the coast and Dusuns and Muruts in the interior. The total population in 1911 was 208,183, of whom some 26,000 were Chinese and 355 Europeans. The chief town and seaport is Sandakan (pop. with suburbs, 12,000 in 1911), situated on a harbor of the same name, on the northeastern coast. Kudat, Gaya, Papar, and Silam are important stations. While this territory is held and administered by the British North Borneo Company, yet since May 12, 1888, the British government has exercised a formal protectorate over it.

The chief products are timber, tobacco, rice, sago, coffee, spices, gums, and sea and jungle produce. Imports and exports in 1911 amounted to 4,603,071 and 4,836,795 Straits Settlements dollars, respectively. The government issues its own paper notes and copper coinage, accounts being kept in Straits Settlements dollars and cents. Revenue and expenditure in 1911 were 1,366,768 and 829,251 dollars (exclusive of 574,385 dollars expended on railway construction and other public works).

When the Singapore-Labuan-Hongkong cable was completed in 1894, a cable (about 10 miles

long) was laid to connect Mempakol, on the west coast of the mainland, with Labuan (Labuan in 1907 was annexed to the Straits Settlements). Connecting with the cable, the telegraph was constructed to Beaufort, whence lines now extend to Jesselton and Kudat, to Sandakan and Lahat Datu, and to Brunei Bay. Total telegraphs open, over 700 miles. A railway is in operation from Brunei Bay to Beaufort (20 miles), from Beaufort to Jesselton (57 miles), and Beaufort to Tenom (33), railway in operation, including all branches, 130 miles. At Jesselton there is a steel jetty at which vessels of 2000 tons can load and discharge cargo.

Brunei (Borneo) lies southwest of British North Borneo, occupies the coast as far west as Baran River, covers an area officially estimated at 4000 square miles, and has a mixed population of about 30,000. Its chief town is Brunei (pop. 10,000). It is governed by a sultan of Brunei, but is under British protection. Brunei has been called the "Venice of the East." Its trade is of little importance, the chief article of export being sago.

Sarawak lies southwest of Brunei and extends along the northwestern coast of Borneo for a distance of about 380 miles, from Cape Baram to Cape Datu. Its southern limit is the watershed of the Krumbang and Klinkang mountains. It covers an area estimated at 42,000 square miles and has a mixed population of about 500,000. The chief town and capital is Kuching, with a population of about 25,000, 23 miles from the coast, on the Sarawak River. Sibn, on the Rejang River, which is navigated for some distance by large steamers, is another important town and has a large population of Chinese traders. The territory is governed by a rajah (of the English Brooke family), but is under British protection. Commercially Sarawak is of considerable importance, the import trade in 1911 amounting to 5,666,441 Straits Settlements dollars, and the export to 7,132,926. The revenue and expenditure in 1911 were 1,420,420 and 1,341,761 dollars, respectively, the revenue being derived from both import and export duties and various personal taxes. The chief products are tobacco, sago, rice, gums, coffee, spices, jungle produce, and dried fish. Coal is abundant, and the precious metals, diamonds, and mercury are found. The gold export increased from 23,685 dollars in 1898 to 1,839,956 in 1905, and then decreased to 992,915 dollars in 1911. Both the Church of England and the Roman Catholic Church have established missions and built churches. Several schools have been established at Kuching.

Dutch Borneo, which occupies the southern and most of the eastern part of the island, has a coast line extending from St. Lucia Bay (lat. 4° 10' N) in northeast Borneo to Cape Datu on the west coast. It has an area of about 213,645 square miles and a population estimated in 1905 at 1,233,655. The country is divided into two outpost provinces—West Borneo and South and East Borneo. In 1905 the estimated population of West Borneo was 450,929, of whom 400,332 were indigenes, 48,348 Chinese, 1342 Arabs, 374 Europeans, and 533 others. South and East Borneo, 782,722, of whom 772,532 were indigenes, 1714 Chinese, 1799 Arabs, 1008 Europeans, and 213 others. By religion the indigenes in West Borneo and in South and East Borneo, respectively, were reported as follows: Mohammedan, 171,741 and 657,575, Animistic, 111,990

and 84,217; Christian, 62 and 1985; no specific religion, 116,539 and 28,755. The Dutch govern the country, so far as possible, through the native rulers. West Borneo embraces the valley of the Kapuas, and has great mountain ranges on the northern and southeastern boundaries; on the coast it extends from Cape Datu on the north to Cape Sambur on the south. It has an area of 56,060 square miles. The chief city is Pontianak, on the Kapuas River. Sambas, Sintang, and Sukadana are important towns. The exports amount to over a million and a half dollars a year. The chief of these are copra, gutta-percha, rattan, and coconut oil. South and East Borneo, which extends from Cape Sambur to St. Lucia Bay, and occupies the southeastern half of the island, has an area of 157,585 square miles. The chief city and capital is Banjarmasin. Other important towns are Kotarigin in the southwest, Matapura in the south, Pasir in the southeast, Tangarung, Somarinda, and Koti in the east, and Gunung Tebui in the northeast. The regions best known and most densely populated are in the south and west. North of the Pasir River the interior and even the coast is but little known. The chief exports are gutta-percha and rattan.

Inhabitants.—Although the vast extent of the island, with its numerous cave and other shelters, shell heaps, etc., has not been completely explored, the human remains and evidences of man's industry so far discovered go to prove that man is a much less ancient resident than in Java and Sumatra. The native population, recent immigrants of other races like the Arabs and Chinese excluded, belong, as their languages show, without exception, to the Malayan family. It is possible, but not certain, that at one time Borneo was peopled by the Negrito race; for though no communities of this race now exist, individuals from the northern districts suggest an infusion of Negrito or Negroid blood. The interior and certain portions of the coast are peopled by the Dyaks (nomadic and sedentary, land and sea Dyaks, the farther away from the coast the less mixed with other Malayan peoples, Chinese, etc.), the best-known aborigines of the island. A great part of the coast region is controlled by Malays, the descendants of colonists from the peninsula of Malacca, the islands of Java, Sumatra, and other islands of the great East Indian Archipelago, Bugis from Celebes, and, in the extreme north, Suluans from the Sulu Archipelago in the Philippines. The Malays and the Bugis are the more civilized classes and are more devoted to trade, commerce, and a sedentary life; and it is from the Malay state of Brunei, north of Sarawak, that the island has received its name. The Malays profess Islam, the Dyaks, those of the interior especially, retain much of their primitive shamanism and nature worship. Borneo has been the classic land of the "head-hunter," and here are to be found many other curious Malayan customs. It is also the home of a species of blowgun and the poisoned arrows that belong with it. The simplest culture is possessed by the Punans, who alone of all the natives do not plant rice, but collect wild fruits and hunt game. Their main industries are matting and basketry, other manufactured objects being obtained from the more civilized tribes through barter.

Borneo was first discovered by Europeans in the early part of the sixteenth century, when

both the Portuguese and Spaniards visited it. The Portuguese soon established commercial relations with the natives. In the latter part of the century the Spaniards also entered upon similar relations. Neither of these European peoples, however, had any very marked influence on the country. The Dutch began trading in Borneo in 1604, and five years later the English appeared and gained a foothold in the south, which they held for nearly a century. In the early part of the eighteenth century the Dutch forced the English out of this section, but about the middle of the century the latter reappeared in the northern part. Then, after a lapse of about 25 years, the English influence waned for half a century, to be renewed in the early part of the nineteenth century, chiefly through the activity of Sir James Brooke. Meanwhile the Dutch slowly but surely strengthened their position in the southern and eastern parts of the island, by affiliating their governing officers with the native chiefs, through whom they controlled the people.

The only portion of Borneo which has yet been developed to any extent is the British. By 1888 the territory of the British North Borneo Company became a British protectorate, although still under the control of Rajah Brooke's family (q.v.). A few years later this domain was greatly enlarged by cessions made by the Sultan of Brunei. This brought about a native rebellion headed by Mat Saleh which assumed such large proportions that in 1900 a considerable military expedition was found necessary to expel him. Great trouble has been caused of late years by the exploitations of the great rubber companies, and it is feared that when Rajah Brooke's nephew dies the natives will lose what protection they now have. In 1913 the boundary between the British and Dutch territory was finally determined.

Consult: Bemmelen and Hooyer, *Guide to the Dutch East Indies* (London, 1897); Lith, *Encyclopedie van Nederlandsch-Indië* (Leyden, 1895); Posewicz, *Borneo: Its Geology and Mineral Resources* (London, 1892); O. W. S., *European Settlements in the Far East* (New York, 1900); D. Cator, *Everyday Life among the Head-Hunters* (New York, 1905); A. W. Nieuwenhuis, *Quer durch Borneo*, vol. i (Leyden, 1904); Hose and McDougall, *The Pagan Tribes of Borneo* (London, 1912).

BORNEO CAMPHOR. See BORNEOL.

BORNEOL, $\text{b}^{\text{or}}\text{n}^{\text{e}}\text{-ol}$, or BORNEO CAMPHOR ($\text{C}_{15}\text{H}_{26}\text{O}$). A substance often used as a substitute for common or Japan camphor. It is a crystalline organic compound, similar to common camphor, but having an aromatic, pepper-like odor. It sinks in water and is thus readily distinguished from common camphor. Borneol is obtained chiefly from the *Dryobalanops camphora*, growing in Borneo and Sumatra. It is one of the constituents of oil of rosemary and occurs in the rhizome and roots of the *Valeriana officinalis*. It can be produced by reducing common camphor with nascent hydrogen. The hydrocarbon Borneene ($\text{C}_{15}\text{H}_{24}$) is obtained by distilling borneol with anhydrous phosphoric acid.

BORNET, $\text{b}^{\text{or}}\text{n}^{\text{e}}\text{-}^{\text{e}}$, JEAN BAPTISTE EDOUARD (1828-1912). A French botanist, born at Guérigny (Nièvre). He studied medicine in Paris, and botany, especially fungi, under the direction of Tulasne (q.v.) and Leveillé. Afterward he accompanied Thuret to Cherbourg, where he devoted his attention chiefly to the study of

marine algae, with which several of his books deal. His works, in some of which he collaborated with Thuret, include *Recherches sur la structure de l'alghe pubescens* (1852), *Recherches sur la fécondation des Floridées* (1867), *Recherches sur les gonidies des Lichens* (1873), *Notes algologiques, recueil d'observations sur les algues* (1876-80), *Revisions des Nostocacees hétéocystées*, in collaboration with Flahault (1886-88), *Les Algues de Schönsboe* (1892).

BORNHOLM, *börn'hölm* (anciently, *Borgundarholmi*, Burgundians' Island, from Old Norse *hölmr* Ger. *Holm* Eng. *holm*, an islet). An island in the Baltic Sea, belonging to Denmark and situated 90 miles east of Zealand, in lat 55° N, long 15° E. Area, 223 square miles (Map Denmark, G 2). Most of the island consists of granite and gneiss and forms a plain about 270 feet above the sea, with coal on the west coast, and a fine grade of porcelain clay used for industrial purposes. The inhabitants carry on successfully agriculture and cattle raising and the manufacture of porcelain ware. The capital, Rønne, on the west coast, has over 8000 population and is connected by a railroad 23 miles long with Nekso on the east coast. There are four other small towns, but most of the people live on their farms. Population, over 41,000. Independent prior to 1000, the island became a Danish possession, subsequently belonging to Lubeck in the sixteenth century and to Sweden in the seventeenth century, but was returned to Denmark in 1660.

BORNIER, *boi'nyá'*, HENRI, VICOMTE DE (1825-1901). A French poet and dramatic author. He was born in Lunel (Hérault), Dec 27, 1825, and after studying at Montpellier, and elsewhere, went to Paris to become a law student. About the same time he published his *Premières feuilles* of verse and the *Comédie Française* accepted his play, *Le mariage de Luther* (1845). He received a post at the Bibliothèque de l' Arsenal, where he rose successively, till in 1880 he became its administrator. Among his dramas are *Le monde renversé* (1853), *Dante et Béatrice* (1853), *Agamemnon* (1868), *La fille de Roland* (1875), *L'apôtre* (1881), *Mahomet*, which, though received at the Théâtre Française, was in 1890 forbidden representation, at the request of the Turkish Ambassador, and *Le fils de l'Arétin* (1895). He was the author of numerous other publications in verse and prose and was critic of the *Nouvelle Revue* from 1879 to 1887. His poems on *L'Isthme de Suez* (1861) and *La France dans l'extrême Orient* (1863), and his *Éloge de Châteaubriand* (1864), were crowned by the Academy. Among his novels are *La lieurdière* (1883) and *Le jeu des vertus, roman d'un auteur dramatique* (1885). In 1893 he was elected a member of the Academy.

BORNITE, or **PURPLE COPPER ORE**, PEACOCK ORE. A sulphide of copper and iron of variable proportions, the massive variety being probably a mechanical mixture with chalcocite (*qv*), the crystallized mineral carrying about 55 per cent copper. It occurs in isometric crystals, which, however, are comparatively rare. The common massive varieties have a granular to compact structure with a metallic lustre and are dark copper red, pinchbeck-brown or purple in color, tarnishing rapidly to iridescence. Bornite occurs in Cornwall, Chile, Peru, Bolivia, Mexico, Canada, at Bristol, Conn. and near Wilkesbarre, Pa. It is mined for copper.

BORNU, *būr nōw'* (from the tribe *Berauni*, *Bernūni*). Formerly a Sudanese native state, the greater portion of which (some 50,000 square miles) is now embraced in the northeastern end of Northern Nigeria, between lat 11° and 15° N and long 10° and 15° E, and bounded by Sokoto, the Sahara, Lake Chad, and the Shari River (Map Africa, F 3), while the remainder belongs to France and Germany. The surface is mostly level, with the exception of the southwestern part, where some of the mountains rise to an elevation of about 2000 feet. The climate during part of the year is excessively hot and unhealthful, the temperature not infrequently rising above 100° during the summer. The rainy season lasts from five to seven months, when malaria and other diseases are prevalent. The two principal rivers are the Shari and the Waube, both of which fall into Lake Chad. The soil is fertile, but the climatic tendency is to desiccation, and the desert is encroaching upon the northern border. Maize, millet, bailey, rice, various kinds of pulse, cotton, and indigo are grown. In former years slaves were very extensively dealt in, and exported to many countries, but slave raiding is now prohibited under severe penalties. At the head of the state was a sheik, who had absolute power and was assisted by a council. Bornu was divided into several provinces and had also a number of vassal states and dependencies. There was an army of about 5000 men. The native capital was transferred in 1908 from Kuka (*qv*), with a population of about 60,000, to Maidugari, where a native *sheik* is enthroned. A British resident administers the British territory. The population of Bornu is estimated at 5,000,000 and consists of a number of mixed negro races. The bulk of the population are known as the Bornuese, or Kanuri, a Mohammedan tribe of mixed negro and Berber blood. The territory of Bornu was invaded in the twelfth century by the Mohammedan ruler of Kanem. After 200 years of warfare the aborigines were either extirpated or completely subjected, and from 1533 a line of kings ruled over the country. Bornu was at the height of its power at the close of the sixteenth century, when its western frontier extended to the Niger River. After 1600 it underwent a rapid decline. In the beginning of the nineteenth century it was conquered by the Fellatahs, whose yoke, however, was soon shaken off, under the leadership of a fanatical fakir, named Mohammed el Kanemi, whose services were called in by the Sultan. Mohammed founded the town of Kuka and ruled there under the title of "Sheik," while the Sultan enjoyed only nominal power. Mohammed's son, Omar, became Sultan as well as Sheik. In 1882 Omar was succeeded by the Sultan Abu Bekr. Our knowledge of the country (though scant) is due to the travels of Barth, Nachtigal, and subsequent British, French, and German explorers.

BORO BUDDOR (Hind Great Buddha). The ruin of a Buddhist temple in Java, residency of Kadu, regency of Magelang, and district of Minoreh, near the junction of the Ello and Progo. It is the most elaborate monument of the Buddhist style of architecture anywhere existing. The building of Boro Buddor is assigned to the seventh century. It is a pyramid of a square form, each side of the base measuring 600 feet, and consists of seven walls, which are built like the steps of a stair up a hill. Between the walls are narrow terraces running

round the building. The walls are richly ornamented with statuary. Outside are niches, each of which is occupied by a statue of Buddha, larger than life, with the legs crossed under the body. The number of these figures is about 400. Between each two of these are bas-reliefs representing Buddha in the same attitude, besides architectural ornaments and carvings of all sorts. Below the niches, on the lower story, is an immense bas-relief encircling the whole building, representing scenes from the life of Buddha and religious subjects. The inner faces of the building are also profusely ornamented with bas-reliefs, seated figures, and architectural designs. The whole is a splendid artistic epitome of Buddhism just before its decline. The five lower concentric terraces are on a square plan and may represent a Buddhist *vihara* (q.v.), or monastery. The three uppermost terraces are circular and represent the *tops* (q.v.). They are surmounted each by a tier of small domes, 72 in all, each containing a statue of Buddha; while in the centre, rising high above everything else, is the large dome or pagoda (q.v.) for the relic of Buddha. Consult Playte, *Die Buddha-Legende in den Skulpturen des Tempels von Bôrd-Budur* (Amsterdam, 1901).

BORODIN, b'ô'rô-dîn', ALEXANDER PORFIRYEVICH (1834-87). A Russian composer and chemist. He was born in St. Petersburg, of a very ancient family. He studied medicine and chemistry at the Medico-Surgical Academy, practiced medicine for a while, and, being appointed to the chair of chemistry at his *Alma Mater*, went abroad to prepare for his duties. It is claimed that, during his studies in Paris, Heidelberg, and Italy, he had anticipated Wurtz in the discovery of aldol. In all, he wrote 21 articles and monographs of importance. During the Liberal movement of the sixties (see RUSSIAN LITERATURE) he espoused the cause of university education for women in Russia, and from 1872 till his death gave gratuitous instruction in chemistry at the Medical School for Women, opened by Professor Rudnyeff and Madame Farnoskaya. Amid his arduous professional duties he found time for composition as a recreation only. His musical studies had begun quite early. At nine he played on his piano the music performed by regimental bands, and at 13 wrote a concerto for the flute. With a friend he played over all the symphonies of Beethoven, Mozart, and Haydn in arrangements for four hands. Besides, for chamber music, Borodin learned to play the 'cello, and his friend the violin. Later he joined the circle of Balakireff (q.v.) and took up music seriously. While abroad he met Liszt, who later classed him as one of the greatest musicians of the age and made his works known in western Europe. He wrote his first symphony in 1862-67, and then in 1869 began the opera *Prince Igor*, on a libretto based on the epic *Prince Igor's Band* (q.v.), but soon left the work and utilized the composed parts for his second symphony (1869-70), the so-called "heroic." He then resumed work on the opera, which, however, was still unfinished at his death. It was orchestrated and finished by Rimsky-Korsakoff (q.v.) and Glazunoff (q.v.) and scored an enormous success at its first performance in November, 1890. He also wrote two string quartets besides a score of songs, of wonderful lyric depth. His *In Central Asia* (1880), a "musical picture," is one of the mainstays of the concert room. Two movements of his third sym-

phony were reconstructed by Glazunoff, partly from rough draughts and partly from memory. Though a member of the Balakireff circle, Borodin could not give up the rounded forms of the classical opera. His talent was essentially melodic, and his cantilenas are stamped with breadth and power. The epic might and the Oriental coloring of his orchestration in *In Central Asia* hold a place among the most notable musical achievements in the field of programme music. Consult Habets, *Life and Works of a Russian Composer*, Eng. trans. by Rosa Newmarch (London, 1897).

BORODINO, b'ô'rô-dyê-nô'. A village of Russia, in the government of Moscow, about 70 miles west of the city of that name (Map: Russia, E 3). It is situated on the Kaluga, an affluent of the Moskva, and gave its name to the great battle fought between the French army under Napoleon and the Russians under Kutusoff, Barclay de Tolly, and Bagration, Sept. 7, 1812. The battle of Borodino was one of the most obstinate in history, and the loss on both sides was almost equally great. The struggle consisted chiefly in the attempt of the French to capture three lines of redoubts barring the way to the city of Moscow. These were thrice won and lost during the day. Out of 257,000 men engaged, between 70,000 and 80,000 were killed and wounded. The Russians retreated on the following day, but in the most perfect order and without the enemy's venturing to attack them. The Russians, therefore, have always regarded this battle as a victory, and in 1839 raised a fine mausoleum on the battlefield. To the French, however, certainly belongs the honor, as they not only remained on the field of battle, but soon after pushed on to Moscow. The French call it the battle of the Moskva, from the river of that name, and it gave Marshal Ney his title of Prince of Moskva. A magnificent description of the weird splendor and the horrors of the battle may be found in Count Leo Tolstoi's novel, *War and Peace*.

BORON (from *borax*, of which it is a component). A non-metallic element, which was isolated in 1808 by Gay-Lussac and Thénard in France and in 1809 by Sir Humphry Davy in England. Some of the compounds of boron were known to the ancients. The element is not found native, but occurs in combination in the following minerals: *sassolite*, a boric acid; *borax*, a sodium borate; *boracite*, a magnesium borate with magnesium chloride; and *ulecite*, a sodium and calcium hydrous borate. Boron was originally obtained by heating boric oxide with metallic potassium, then boiling the fused mass with hydrochloric acid to remove the soluble salts; while the residue, consisting of amorphous boron, was washed with water and dried. It can also be obtained by the electrolysis of fused boric oxide. As thus prepared, boron (symbol, B; atomic weight, 11.0) is an odorless, grayish-brown amorphous powder. It is a non-conductor of electricity and fuses only at a very high heat. It may be melted by placing it between the poles of a battery of 600 Bunsen cells. The specific gravity of amorphous boron is 2.45. A crystalline variety of boron was prepared by Wohler and Deville in 1856. It may be obtained by heating the amorphous variety for two hours with metallic aluminum to a temperature of from 1500° to 1600° C. Small monoclinic crystals are pro-

duced by this process, which, however, contain a small amount of aluminum. These crystals have been called *boron diamonds*, owing to their lustre and hardness, as they scratch both ruby and corundum. They have a specific gravity of 2.68. Boron is the only non-metallic element that forms no compound with hydrogen. Its principal commercial compounds are boric acid, boric oxide, and certain borates, especially borax.

BORORÓ A rapidly decreasing native American tribe inhabiting the region between upper Paraguay and upper Paraná. They are tall (m 174) and athletic and live by the chase, using bows of great length with arrows of cane tipped with bone or tooth. Polygamy prevails among them, with occasional polyandry. The institution of the "men's house" is known to the Bororó. The Bororó are fond of feather decorations, and practice ear and lip piercing. In the first half of the eighteenth century these Indians roved about the region of the Xingú-Araguaya watershed in central Matto Grosso. Branches of the Bororó are the Bororó da Campanha (Plains Bororó), Bororó Cabações (Bororó of the river Cabaçal), "Coroados" (Bororó of the river S. Lourenço). The decrease in numbers is due largely to conflicts (1876-80 and since) with the whites. Up to the present the Bororó language has been regarded as an independent stock, but recent studies of Rivet, etc., seem to indicate that it is a dialect of the adjacent Otukuan (Otuke) family. Consult Frié and Radin, in the *Journal of the Royal Anthropological Institute* for 1906, Chamberlain, in the *American Anthropologist* for 1912, and De Créqui-Montfort and Rivet in the *Journal de la Société des Américanistes de Paris* for 1913, also *I Bororós-Coroados del Matto Grosso-Brasil* (Turino, 1906), published by the Salesian missionaries, and Cook, in Smithsonian Institution, *Miscellaneous Collections*, vol. v, p. 50 (Washington, 1907).

BOROSA See **BARRÓSA**.

BOROUGH, bū'ró (AS *burh*, *burg*, Ger *Burg*, a fort, from AS *beorgan*, to protect.) In Great Britain, an incorporated municipality, either village, town, or city, having the right of returning one or more members to Parliament. Boroughs existed in England from the earliest times. According to the Domesday Book, there were 82 boroughs. Each of these had a market or an annual fair, was ruled by an elective officer, usually called the "portreeve," and had the privilege of a special borough court, which was independent of the larger divisions, known as hundreds and shires. The Normans utilized these units of government, supplanted the portreeves with officers deriving their authority directly from the throne. By the time of Henry VI the boroughs had generally become municipalities, with the power of government vested in the members of the principal guilds. During the same period the boroughs obtained the right of sending burgesses to Parliament. In course of time many of these boroughs decreased in population and became little more than names, but without losing their parliamentary representation, others came entirely under the control of members of the nobility and acted in elections only under such restraint. These two classes of boroughs received the names respectively of "rotten boroughs" and "pocket boroughs." Many of these were swept out of existence as regarded their parliamentary rights

by the Reform agitation, which culminated in the Reform Bill (q.v.) of 1832. The borough system of Scotland (see **BURGH**) is of even greater antiquity than that of England. A confederation of boroughs for purposes of mutual defense and the protection of trades existed in the reign of David I and was called a "Hanse."

In Connecticut, New Jersey, Minnesota, and Pennsylvania the term "borough" is applied to incorporated towns or villages of a lower grade than a city. William Penn's charter to the territory west of the Delaware River authorized him in 1681 to erect the country, among other divisions, into boroughs similar to those of England. This system of boroughs continues in Pennsylvania to the present time. In 1619 Virginia had 11 boroughs, the delegates of which sat in the House of Burgesses, but boroughs, as in incorporated towns, never obtained a footing in that State. The charter granted to Lord Baltimore entitled him to create boroughs in Maryland, but they were never so created. In New Jersey boroughs date back to the early part of the eighteenth century, but they were erected by special acts and without uniformity of system until 1818, when a General Borough Act was passed.

Greater New York, by an Act passed by the Legislature of 1897, was made a city, composed of five boroughs—Manhattan, the Bronx, Brooklyn, Queens, and Richmond. See **BURGH**.

BOROUGH ENGLISH (from Anglo-French *tenue en burgh englois* *tenue* in an English borough.) A curious custom that prevails in some parts of England, according to which the youngest son inherits real property in preference to his elder brothers. The name is a misnomer, as the custom is not distinctly English and was seldom found in boroughs. In mediæval England it prevailed widely as a frequent incident of villein tenure (See **VILLEINAGE**). The reason assigned for the custom by Littleton is that the youngest son, on account of his tender age, is not so capable as his elder brothers of maintaining himself. Blackstone, however, suggests, what is doubtless nearer the truth, that the custom is a survival out of the conditions of primitive society—a view which is strengthened by the sporadic occurrence of the custom in widely separated parts of the continent of Europe. Nothing is known of the social conditions under which ultimogeniture, or inheritance by the youngest born, originated, but it must have prevailed extensively at some early period of human history. There are other survivals of it, besides Borough English, in England as well as in other European countries, such as the preference of the youngest daughter or the youngest among collateral relations, as brothers, over the older sisters or brothers. See **GAVELKIND**, **INHERITANCE**, **PRIMOGENITURE**. Consult Blackstone, *Commentaries on the Laws of England*, Elton, *Origins of English History* (London, 1882), Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899), Robinson, *Gavelkind*, which gives instances of the occurrence of the custom in recent times.

BOROUGH JUSTICES Local justices in certain boroughs with the jurisdiction of justices of the peace, first appointed in the time of Charles I. Under the Municipal Corporations Act (1882, 45 and 46 Vict. c. 50), these justices consist of the mayor during his year of office, and for one year after it determines, the recorder *ex officio*, and such persons as the crown

may appoint by commission. Their duties cannot be delegated, and, before taking office, they are, like other English judges, required to take the oath of allegiance and the judicial oath. See **BOROUGH**; **JUSTICE OF THE PEACE**.

BOROUGH LAWS. In Scottish legal history, a code of ancient laws which have long ceased to have any force, but which serve to throw light on the ancient manners and customs of the country. The authenticity of the compilation was for a long time doubted, but has been established beyond question. It is supposed to have been made in the reign of David I, in the twelfth century. See **BRETTS AND SCOTTS**; and consult Erskine, *Principles of the Law of Scotland* (18th ed., Edinburgh, 1890).

BOROVICH, bō-rō-vē'chē. A town in the government of Novgorod, Russia, on both sides of the Msta, near the famous rapids of Borovich (Map: Russia, D 3). The inhabitants are engaged in shipbuilding, the dyeing of cloth and cotton goods, and the production of earthenware. The natives are famous for their skill as pilots, for which the proximity of the rapids is mainly responsible. Peter the Great considered them of such importance to the commerce of the country that he freed the town of all state taxes in order to induce its inhabitants to continue their dangerous occupation. Borovich has a salubrious climate and, owing to its comparative proximity to St. Petersburg (200 miles), is a favorite summer resort of the residents of the capital. Pop., 1897, 9421.

BOROWSKI, bō-rōf'ski, FELIX (1872-). An American composer. He was born March 10, 1872, in Burton, England, of Polish parents. His father was his first teacher on the piano and violin. In 1886 he entered the Conservatory of Cologne. In 1890-94 he lived at Aberdeen, devoting his time chiefly to teaching the violin. The next three years he spent in London. In 1897 he came to America, settling permanently in Chicago. While he continued to compose, he held a position as professor of composition in the Chicago Musical College, and as critic of the Chicago *Evening Post*. In 1909 he became musical editor of the Chicago *Record-Herald*. After 1908 he also wrote the analytical programmes for the concerts of the Theodore Thomas Orchestra. His compositions are a symphonic poem (*Eugene Onegin*), *Marche Triomphale*, two orchestral suites; a concerto for piano and orchestra; works for violin, piano, and organ, and songs.

BORROME/AN ISLANDS (so named after the Borromeo family). Four small rocky islands in Lago Maggiore (q.v.), in north Italy (Map: Italy, C 2). These islands are famed for their beauty, due partly to their surroundings and partly to the degree of their artificial development from mere rocks to luxuriant gardens. The one best known to tourists is Isola Bella, on which Count Vitaliano Borromeo, in the latter part of the seventeenth century, built a castle, which contains some good paintings and other art treasures, but the north wing of which is still unfinished. The garden, which rises in 10 terraces on the southern slope, contains rare plants and numerous shell grottoes and is adorned with fountains and statues. On Isola Madre the terraced garden is less extensive. The population of the islands is about 300.

BORRAMEO, bō-rō-mā'ō, SAINT CARLO (1538-84). An Italian prelate and reformer. He was born Oct. 2, 1538, at the castle of Arona, on

the west bank of Lago Maggiore, the family seat of his ancestors. He studied law at Pavia, and took the degree of doctor in 1559. His uncle, Pope Pius IV (1559-65), soon after being raised to the pontificate, appointed him, notwithstanding his youth, to a number of high offices and made him a Cardinal and Archbishop of Milan. Borromeo displayed great faithfulness and ability in governing Ancona, Bologna, and other parts of the States of the Church as legate, and in discharging the duties of offices connected with ecclesiastical administration in Rome. Though surrounded with magnificence and luxury, he was always grave, pious, and rigid in his life, studious, and a patron of letters.

Pius IV made him his grand plenipotentiary and did nothing important without his coöperation. It was in a great measure through his influence that the reopening of the Council of Trent was accomplished and that its deliberations were brought to a conclusion so satisfactory to the papal wishes. He committed its decrees to memory, had the principal part in drawing up the *Catechismus Romanus* for exposition of them, and proceeded to give all possible effect to them in his archiepiscopal province. His efforts to secure religious instruction of children made him one of the forerunners of the modern Sunday school. Borromeo's exertions, not only for the improvement of ecclesiastical discipline, but also for the reformation of morals in the archbishopric of Milan, aroused the hostility of some local monastic orders, and also, to some extent, that of the Spanish authorities in Milan, who were jealous of the extension of his jurisdiction. An attempt was even made upon his life in 1569. He spent a great part of his income in beautifying the cathedral and other churches. With a view to providing well-qualified priests, he founded in 1570 the Helvetic College in Milan. He brought about an alliance of the seven Catholic cantons, known as the Golden Borromeo League, for the united defense of their faith. He exerted his energies successfully in extirpating Protestantism from Milan by means of the Inquisition. In the famine of 1570, and during the plague in Milan in 1578, he displayed great energy and benevolence, saving the lives of multitudes by the prompt arrangements which he made for necessary relief. Exhausted by his labors and his austerities, he died on Nov. 3, 1584. He was canonized in 1610, and his day is celebrated on November 4. His embalmed body, enshrined in a silver sarcophagus and visible through a lid of rock crystal, lies in Milan Cathedral in the Cappella San Carlo Borromeo beneath the dome, where it may be viewed by permission.

His theological works were published at Milan, in 1747, in five volumes folio. On the western bank of Lago Maggiore, in the neighborhood of his birthplace, a colossal brazen statue of him, 70 feet high, was erected in 1897. His brother's son, Count Federico Borromeo, born 1564, was also a Cardinal, and from 1595 to 1631 Archbishop of Milan, and was the founder of the Ambrosian Library (q.v.). He died in 1631. For biographies of Borromeo, consult Sylva (3 vols., Bruges, 1884); also Thompson (London, 1893); Stacpoole-Kenney (New York, 1911).

BORROMINI, bō-rō-mē'nē, FRANCESCO (1599-1667). An Italian sculptor and architect, born at Bissone (Lombardy). He studied sculpture in Milan, and architecture in Rome under Carlo Maderna, then architect of St. Peter's, whom he

assisted in some of his work. After Maderna's death he continued for some time under the direction of Bernini, but an unreasoning hatred for Bernini sadly disfigured both his character and his art. Bent upon surpassing his rival, he attempted the arbitrary and the bizarre and became one of the chief representatives of the extreme baroque style. He built the churches of San Carlo alle quattro Fontane and San Ivo alla Sapienza, the oratory and cloister of San Filippo Neri, the facade of the church of Sant' Agnese in the Piazza Navona, the Palazzo Falconieri, and the interior of San Giovanni in Latraneo. All these works are in Rome. Mortified at Bernini's success, he killed himself in an access of hypochondria.

BORROW, GEORGE HENRY (1803-81) An English author. He was born at East Dereham, Norfolk, July 5, 1803, the son of Capt. Thomas Borrow, of the West Norfolk Regiment. Moving with his father's regiment from one station to another, he saw much of England. He was also for a short time in Edinburgh, where he attended the high school, and then in Ireland. In 1816 the family settled at Norwich, and three years later George was articled to the law. He had already acquired some knowledge of seven languages, and now, instead of attending to the law, he proceeded to study seven more. He had also become interested in the gypsies and had read many tales of wild adventure. On the death of his father (1824) he went to London, where he was employed as compiler and hack, his longest production was *Celebrated Trials* (1825), giving the record of all sorts of criminals. To this period also belongs *Romantic Ballads* (1826), translations from the Danish. In 1838 Borrow was appointed agent for the British and Foreign Bible Society. Now began, in the service of this society, his extensive tours through Russia and afterward through Portugal and Spain. Later he traveled as far east as Constantinople. True to his youthful predilection, he made the gypsies scattered over every part of Europe one of the principal subjects of his study, and he was continually adding to his vast linguistic knowledge. In 1840 he married and settled on Oulton Broad, near Lowestoft. From here he made many excursions through Celtic Britain—Cornwall, Wales, Ireland, etc.—and for a time lived at Yarmouth. In 1860 he removed to London, and in 1874 returned to Oulton, where he died, July 26, 1881. Borrow was a man of splendid physique. His knowledge of languages was probably more extensive than profound. But in literature he has left a name. His first important work—*The Zingari*, an account of the gypsies in Spain—appeared in 1841. It was followed two years later by *The Bible in Spain*, the most widely read of all Borrow's works. In 1851 was published *Lavengro*, and in 1857 its sequel, *The Romany Rye*. These three fascinating books are largely autobiographical. Indeed, Borrow's personality, tinged with superstition and curiously whimsical traits, has interested more persons than his literary and linguistic attainments. Of almost equal interest is *Wild Wales* (1862). For an authoritative life of Borrow, consult Knapp (2 vols., London, 1890). Knapp has also carefully edited *Lavengro*, *The Romany Rye*, together with Borrow's correspondence (2 vols., New York, 1900). A large literature has lately sprung up regarding Borrow, from which may be selected for mention here, Rickett, *The Vagabond in Literature* (London, 1906), Walling, *George Borrow, the Man*

and his Work (London, 1908), Hubert, *Borrow in Russia* (London, 1909), Thompson, *Borrow's Gypsies* (Liverpool, 1910), Thomas, *George Borrow* (London, 1912), Rodfein, *Some Notes on Borrow* (Manchester, 1913), Shorter, *George Borrow in Scotland* (London, 1913), Shorter, *George Borrow and His Circle* (Boston, 1914).

BORROWING (AS *borgian*, Ger *borgen*, to borrow, literally, to give a pledge, AS *borg*, *boih*, Ger *Borg*, pledge, security). The taking or receiving from another with his consent a sum of money or an article of personal property, with the obligation of returning it or giving an equivalent for it. In the strictest sense of the term it implies that the borrower is under the obligation of returning the specific thing borrowed, as to borrow a book or any other thing to be returned again. In this case it is that form of the contract of bailment (q.v.) legally termed *commodatum*, or loan. Where the agreement is to return another article of the same kind and value, the contract is rather in the nature of a barter or sale of the article loaned, the borrower becoming a debtor of the lender to the value of the article. This is what happens when a sum of money is borrowed. It is not contemplated that the identical money loaned shall be returned, but that the borrower shall pay the amount of the loan to the lender.

Unless the agreement of lending specifies the time when the borrowed article shall be returned, it is returnable at the demand of the lender. Where the lending is gratuitous and without consideration, it imposes no obligation on the lender, and he may terminate the arrangement at his will. The borrower, on the other hand, as a gratuitous bailee, is held to a high degree of care in protecting the borrowed article from loss or injury. He is not, however, liable for its loss or destruction if wholly without his fault. See **BAILMENT**.

BORROWING DAYS The last three days of March in the old-style calendar, or April 11-14 in the present new style. These days were from most ancient times in Scotland called "borrowing days," because they are usually cold and snowy, so that it is said

"March borrows frae April
Three days, an' they are ill,
The first o' them is wun' an' weel,
The second it is snaw an' sheet,
The third o' them is a peck-a-bane,
And freezes the wee bird's neb tae stane."

The meteorologist, Buchan, says that he has examined the records of temperature for a number of years and has shown that there is a distinct cold period between the 11th and 14th of April, corresponding to this old popular saying, the origin of which is lost in the mist of antiquity. Consult Buchan, *Handy Book of Meteorology* (Edinburgh, 1868).

BORROWSTOUNNESS, bōi'ō-stō-nēs' ('the cape near Burward's dwelling,' from AS *Nasu*, in composition *naes*, headland, nose, Lat *nasus*, Ger *Nase*, nose), usually shortened to *Bō'nēs*, bō-nēs'. A seaport in Lunthgowshire, Scotland, in the Firth of Forth, 17 miles west by north of Edinburgh (Map Scotland, E 3). It has coal mines extending under the bed of the Forth, and manufactures of iron salt, soap, malt, vitriol, and earthenware. It has an export trade in coal, iron and steel manufactures, and manures, and imports maize, timber, iron ore, paper-making materials, etc. Limestone, limestone, and freestone exist in the parish. Graham's

Dike, a part of the Roman Wall of Antoninus, traverses the parish. Dugald Stewart (q.v.) lived near Borrowstounness. Pop., 1901, 9306; 1911, 10,802.

BORS. The name of the King of Gaul in the Arthurian story. He was brother of King Ban of Benwicke, and both were Arthur's faithful allies.

BORS, or BO'HORT, SIR. One of King Arthur's knights, and nephew of Lancelot. When Guinevere was accused by Sir Nador, Bors was appointed to fight for her; but on the day of the contest his place was taken by Sir Lancelot.

BORSIPPA, bôr-sîp'pâ. A town situated on the west bank of the Euphrates, opposite the city of Babylon, and forming, in the days of the last Chaldean monarchy, a suburb of Babylon itself. There are indications that the place was fully as old as Babylon. The chief deity worshiped at Borsippa was Nabu (or Nebo), to whom Tashmîtu is given as a consort. Nabu—originally, as would appear, a water deity—becomes the patron of letters and learning in Babylon. He is the god of writing and wisdom in general. His temple at Borsippa was known as E-zida the "true" (i.e., fixed and legitimate house), and a solemn pilgrimage was made to it on the Babylonian New Year's festival. The site of Borsippa is represented by Birs-Nimrud, where there are ruins of a *zikkurat*, or temple tower.

BORSTELL, bôr'stêl, KARL HEINRICH LUDWIG VON (1773-1844). A Prussian soldier, born at Tangermünde. He served as commander in chief in Pomerania in 1812, and in this capacity did much to check the excesses of the French. As major general he took a prominent part in the campaigns of 1813, and his bold though unauthorized move at Dennewitz decided that conflict. At the battle of Leipzig (Oct. 16-19, 1813) his brigade was the first to enter the gates of the city. Soon afterward appointed lieutenant general, he accompanied Bülow's corps to Holland (1814), and after the departure of that general remained behind with 10,000 men to complete the conquest of the country. While engaged in the organization of the Second Prussian Army Corps, which had been intrusted to him (1815), a revolt, engendered by political discontent, broke out among several Saxon battalions stationed at Liège; and although promptly suppressed, Blücher ordered seven of the leaders to be shot and the flags of the insubordinate battalions to be burned. By reason of his failure to comply with this request, Borstell was sentenced to four years' military confinement. Several months later, however, he was pardoned by the King, who appointed him commander of Magdeburg.

BORT. See DIAMOND.

BORTNYANSKI, bôrt-nyân'ské, DMITRI STEPANOVITCH (1761-1825). A Russian composer of church music. He was born in Glukhov, government of Chernigov, and at seven joined the court choir at the capital, where he studied under Galuppi. The Empress Elizabeth, struck by his musical gifts, sent him to Italy. Under Galuppi, who had left Russia, and other famous masters, he studied for 11 years in Venice, Rome, Bologna, and Naples. He won success with his operas *Creonte* (Venice, 1776) and *Quinto Fabio* (Modena, 1778), but did not mistake his true vocation and clung to the study of the great Italian church composers. His own compositions of this period are distinguished by the lofty nobility and serenity of his models, with hardly a

trace of the floritures and pyrotechnics then in vogue in Italian music and abundant in his operas. On returning to Russia (1779) he was appointed composer to the Court Choir. Paul I transformed it in 1796 into the *Imperial Capella*, of which Bortnyanski was director till his death. Finding the choir in a poor state, Bortnyanski sought out the best voices in Russia, and in a few years the capella became the most famous in Russia. In the service he also found many evils; ignorant choir masters had altered the antique melodies to make their task easier, or had set the texts to secular melodies, trivial and out of keeping with the church atmosphere. He obtained a decree of the Holy Synod to the effect that all part music was to conform strictly with printed texts. For this purpose the music was revised and edited by Bortnyanski.

Bortnyanski, often styled "the Russian Palestrina," made an epoch in Russian church music. His compositions, especially the "Cherubim Song" (which, according to O. Fouqué, is the only one deserving that name), are performed in Christian churches the world over. They combine the austerity of the Greek psalmody with the Italian polyphony. Their simple harmonies embody the deeply devotional spirit of the texts, without studied effects that only distract worshippers. Among his compositions, edited by Tschaikowsky in 10 volumes, are 35 sacred concertos, 8 church trios with choir, a liturgy for three voices, 7 cherubim songs, a collection of psalms, hymns of praise for four voices and two choirs, etc.

Berlioz thus characterizes Bortnyanski: "All his works are imbued with a genuine religious feeling, at times a sort of mysticism which raises the hearer to an exalted state of emotion. In addition, Bortnyanski has a rare skill in grouping vocal masses, an extraordinary knowledge of nuances, a sonorosity of harmony, and, what is most remarkable, an incredible freedom in the disposition of the vocal parts; a contempt for the rules honored both by his predecessors and his contemporaries, especially the Italian masters, among whose pupils he is usually counted."

BORY DE SAINT VINCENT, bô'rê de sâx' vîn'sân, JEAN BAPTISTE GEORGE MARIE (1780-1846). A French naturalist, born at Agen. In 1798 he started with Captain Baudin on a scientific mission to Australia, but was separated from his companion and explored the Île de France, Réunion, and St. Helena alone. On his return he wrote his *Essai sur les îles fortunées et l'antique Atlantide* (1802), and his *Voyage dans les quatre principales îles des mers d'Afrique* (1804). He served at Ulm and Austerlitz, on Soult's staff in Spain, and as a colonel at Waterloo. After this he had to retire to Belgium, and at Brussels he edited, along with Van Mons, the *Annales des sciences physiques* (8 vols.). He also published an admirable work on the subterranean quarries in the limestone hills near Maastricht (1821). He returned to France in 1820 and wrote for Liberal journals and for Courtin's *Encyclopédie*. In 1827 appeared his *L'Homme, essai écologique sur le genre humain*. He rendered an important service to science by editing the *Dictionnaire classique de l'histoire naturelle* (1836). When, in 1829, the French government sent a scientific expedition to the Morea and the Cyclades, the first place in it was assigned to him; and the results of his researches are given in his *Expédition scientifique de Morée* (1832) and in the

Nouvelle flore du Péloponnèse et des Cyclades (1838). In 1839 he undertook the principal charge of the scientific commission which the French government sent to Algeria.

BORYSTHENES, bô-ris'the-néz See DNI-
PER

BORZNA A town in the government of Tchernigov, Russia, a short distance north of the Desna and about 90 miles southeast of the town of Tchernigov (Map Russia, D 4). It has a number of tanneries and oil presses, and a population of (1897) 12,458.

BORZOI A Russian wolf hound. See GREY-
HOUND

BOS, bôs, COENRAAD (1875--). A Dutch pianist. He was born Dec. 7, 1875, at Leyden, and received his musical education at the Conservatory of Amsterdam, where J. Röntgen was his teacher. From the very beginning he showed decided preference for ensemble playing. While living in Berlin he organized with two countrymen, Van Lier (violin) and Van Veen ('cello), a trio which soon enjoyed an excellent reputation. As accompanist he traveled with Ludwig Wullner (q.v.), and attracted more than ordinary attention, so that he came to be in great demand, both in Europe and America. His art shows to special advantage in the works of Brahms, Richard Strauss, and Hugo Wolf, where the piano part demands not only technical skill, but also the mental and emotional qualities of a great interpreter. See ACCOMPANIMENT.

BOS, LAMBERT (1670-1717). A Dutch classical scholar. He was born at Workum, West Friesland, studied at the University of Franeker, and in 1704 was there appointed professor of Greek. All his works are characterized by thorough scholarship and remarkable acuteness. They include *Exercitationes Philologicae* (1700), *Vetus Testamentum ex Versione Septuaginta Interpretum* (1709, new ed., 1805), *Ellipses Graecae* (1702, last reedited in 1808), *Antiquitatum Graecarum, Praecipue Atticarum, Descriptio Brevis* (1714, Eng. trans., 1839), *Animadversiones ad Scriptores Quosdam Graecos* (1715).

BOSA, bô'zà. An episcopal city in the province of Cagliari, Sardinia, on the west coast, near the mouth of the Temoe (Map Italy, C 7). It is an unhealthy town, surrounded by decaying walls, has an old castle, a cathedral, coral fisheries, and tanneries, and is visited fortnightly by coasting steamers. The country produces wine and oil. Bosa is a Roman town and was founded in 1112 by Malaspina. Pop., 1881 (commune), 6096, 1901, 6846, 1911, 6875.

BOSANQUET, bô'sap/kâ', BERNARD (1848--). An English philosopher. He was born at Rock Hall, Alnwick, and was educated at Oxford. From 1871 to 1881 he lectured at University College, Oxford, and from 1903 to 1908 was professor of moral philosophy at St. Andrews University. Among his publications are the following: *Civilization of Christendom* (1893), *Essentials of Logic* (1895), *Aspects of the Social Problem* (1895), *Psychology of Moral Self*, *Philosophical Theory of the State*, *The Principle of Individuality and Value* (1912), *Logic, or the Morphology of Knowledge* (2d ed., 1911), *The Value and Destiny of the Individual* (1913). He also edited a translation of Lotze's *System of Philosophy* (London, 1887).

BOSANQUET, GEORGE STANLEY (1835-1914). A British admiral. He was educated at the Royal Naval Academy at Gosport, England, and

in 1854 was appointed mate of the *Rodney*. He served in the Crimean War and in China at the time of the Tai-ping rebellion. During the latter period of service he was twice severely wounded and was promoted to be commander for distinguished services. In the Egyptian War of 1882 he was captain of the *Northumberland*. He was aid-de-camp to Queen Victoria in 1884. He received several medals from the Turkish and Chinese governments.

BOSBOM-TOUSSAINT, bôs'bôm-tô'sân' See TOUSSAINT, ANNA LOUISA GEERTRUIDA.

BOSC, bôsk, LOUIS AUGUSTIN GUILLAUME (1759-1828). A French naturalist. He visited the United States in 1796 to study the natural history of America and afterward traveled in Italy and was a professor at the Versailles Zoological Garden. He was the author of *Histoire naturelle des vers et des crustacées*, *Nouveau dictionnaire d'histoire naturelle* (1803), and he edited *Dictionnaire raisonné et universel d'agriculture* (5 vols., 1801) and published the *Mémoires* (1880) of his adopted daughter. This was Madame Rolan, the Girondist, loyalty and friendship for whom nearly cost him his head at the time of the Revolution.

BOSCÁN-ALMOGAVÉR, bô-ákan' al'mô-ga-vâr', JUAN (?1490-1542). A Spanish poet, whose real name was Moses Juan Boscá Almugaver. He was born in Barcelona, of an old patrician Catalan family, served for a time in the army of Ferdinand the Catholic, and in 1519 went to Granada, the court of Charles V, becoming soon after tutor to the Duke of Alva. His later years were passed in Barcelona, and he died near Perpignan, in 1542, while visiting his former pupil. Boscán's earlier verse was all cast in the old Castilian measures. It was not until 1526 that the idea of experimenting with Italian metres was suggested to him by a certain Andrea Navagero, a learned Italian who was then Ambassador of Venice to the court of Charles V. He forthwith began to experiment with sonnets and canzones, blank verse, and the octave stanza, and has naively recorded his satisfaction with the result. The innovation was adopted and still more successfully popularized by his friend and disciple, Garcilaso de la Vega (q.v.), and thus he became the founder of a new school of Spanish poetry. He is also remembered as the translator of Castiglione's famous manual for courtiers, *Il Cortegiano*. Boscán's poems were published after his death by his widow, together with some of Garcilaso's, in 1543. The latest edition, including a biographical sketch, is that of W. I. Knapp (Madrid, 1875). Consult also F. Flaminio, *Studia di storia letteraria italiana e straniera* (Lavorio, 1895), and M. Menéndez y Pelayo, *Juan Boscán*, vol. xii in *Antología de poetas líricos castellanos* (Madrid, 1908).

BOSCAWEN, EDWARD (1711-61). An English admiral, popularly known as "Old Dreadnought." He was born Aug. 19, 1711, and was the second son of Viscount Falmouth. He entered the navy in his fifteenth year, passed his examination for lieutenant in 1732, and in 1738 received a command. He won distinction at the taking of Porto-Bello and at the siege of Cartagena in 1741. He had an important share in the victory off Cape Finisterre (May 3, 1747). As a reward he was promoted to the command of the sea and land forces in the East Indies and conducted a long but vain siege of Fort St.

David. In 1751 he became a lord of the admiralty. In 1755 as vice admiral he intercepted the French fleet off Newfoundland, capturing two ships and 1500 men, including the French commander, Hocquart, whom he had taken prisoner twice before. In 1758, as Admiral of the Blue, he was commander in chief of the fleet in the expedition against Cape Breton, capturing that island and St. John's after some hard fighting. On his return he was given a seat in the Privy Council. The crowning success of his career was the defeat he inflicted on the French Toulon fleet, in the Bay of Lagos, Aug. 18, 1759. For this he received the thanks of Parliament, a pension of £3000 a year, and the command of the marines. He died near Guildford, Jan. 10, 1761. Consult: Norway, "Admiral Boscawen, 'Old Dreadnought,'" in *Cornish Magazine*, vol. ii (Truro, 1899); Standing, "Sir Edward Boscawen, K.C.B., Admiral of the Blue," *United Service Magazine*, vol. cxiii (London, 1900).

BOSCH, bōs, HIERONYMUS (c.1450-1516). A painter of the early Netherlands school. His signature "Bosch" is derived from his birthplace Hertogenbosch (Bar le Duc); he is sometimes called Hieronymus van Aken from the provenance of his family. He seems to have passed his life in his birthplace; for there is no evidence of his supposed sojourn in Spain beyond the fact that his paintings were very popular there. His art presents most analogies with that of the early Dutch school of Haarlem. Its resemblance to that of Breugel (q.v.) is due solely to Bosch's influence on that master. He is especially known as the painter of visionary representations of the infernal regions, incantations, and other gruesome subjects, depicted with grotesque humor. In this he was a preacher of morals, but he was also "very much a painter." He alone of the early Netherlanders strives primarily after tonal effect, and he was the very first to paint mood landscapes in the modern sense. (See BARBIZON, PAINTERS OF.) His great influence is attested by the unusual number of imitations and copies of his paintings, and by the wide adoption of his caricature of the human countenance in art. His paintings are especially numerous in Spain. In the Escorial are five, including "The Seven Deadly Sins," "The Hay Wagon," and "The Garden of Pleasure"; in the Prado (Madrid) are three; in Vienna four, of which the most important, the "Last Judgment," is in the Academy; in Berlin are also four, and in the former royal palace, Ayuda, Lisbon, is his well-known "Temptation of St. Anthony," the most copied of all his pictures. The museum of Princeton University possesses his "Christ before Pilate." The most important researches on Bosch are those of Justi, *Jahrbücher der königlich preussischen Kunstsammlungen*, vol. x (1889), and Gluck, ib., xxv (1904). Consult also Schubert-Soldern, *Hieronymus Bosch und Pieter Breugel* (Vienna, 1903), and Von Jan van Eyck bis Hieronymus Bosch (Strassburg, 1903) for his landscape; also Gossart, *Jérôme Bosch* (Lille, 1907).

BOSCH, HIERONYMUS DE (1740-1811). A Dutch poet and philologist, born in Amsterdam. He was a philologist of varied acquirements and an accomplished Latin poet. His *Poemata* first appeared at Leyden in 1803 (2d ed., 1808). He rendered an important service to classical literature by his edition of the *Anthologia Græca*,

with a metrical translation by Hugo Grotius (q.v.), never before published (4 vols., 1795-1810, to which Van Lennep added a fifth volume, 1822). His discourses and treatises on subjects of literature, which are mostly composed in the Dutch language, display profound learning, excellent judgment, and refined taste.

BOSCHOK, bōsh'bōk. The Dutch form of "bush buck" (q.v.).

BOSCH'VARK (Dutch *bosch*, wood, bush + *vark*, hog). The South African river hog (*Potamocheirus africanus*). See SWINE.

BOS'COREL (Fairwood, from It. *bosco*, thicket, OE. *bosch*, *bosch*, Engl. *bush* + *belo*, beautiful). An English farmhouse near Shifnal, Shropshire, famed as the hiding place of Charles II after his defeat by Cromwell, at Worcester, Sept. 3, 1651. With Major Carlis or Careless, who had led the forlorn hope at Worcester, he climbed the "Royal Oak" in Boscorel Wood and was concealed in its thick foliage for 24 hours, while Puritans in quest of him passed to and fro, unaware of his presence. The farmhouse still stands, and the oak is represented by a tree grown from one of its acorns.—The title of BOSCOREL TRACKS has been given to certain contemporaneous writings, published in 1662, giving a graphic description of this passage of the monarch's life.

BOSCOREALE, bōs'kō-rā-ā'lā (It. *bosco*, forest, Eng. *bush* + *reale*, royal). A city in the province of Naples, south Italy, a mile and a half from Pompeii (Map: Italy, E 11). Its name was brought to the notice of the world in 1895, when Baron Edmond de Rothschild presented to the Louvre a mass of first-century silverware discovered in the excavation of a villa there. In the collection are 40 vases, jugs, bowls, etc., and 100 small pieces. The chief trade of the town is in wine and silk. In 1850 a stream of lava from Vesuvius, about a mile and a half broad and 12 feet deep, divided only just in time to leave Boscoreale unharmed, the fiery torrents destroying the woods on either side. Pop., 1881 (commune), 8756; 1901, 9340; 1911, 10,282. Consult: Hérón de Villefosse, "Le trésor de Boscoreale," in *Monuments et mémoires de l'Institut de France*, vol. v (Paris, 1899); *Boscoreale Collection* (New York, 1898); De Cou, *Antiquities from Boscoreale*, in Field Museum of Natural History (Chicago, 1912).

BOS'COVICH, RUGGERO GIUSEPPE (1711-87). A celebrated Italian mathematician and astronomer, born in Ragusa. At an early age he joined the Jesuits and spent his life in scientific pursuits and important public labors. Before the completion of his course of studies in Rome, he was appointed teacher of mathematics and philosophy in the Roman College there. In 1758 he published his famous work, *Theoria Philosophæ Naturalis Redacta ad Unicam Legem Virium in Natura Existentium*, in which he advanced a molecular theory of matter, maintaining that substances consist of a system of material points which attract or repel each other, according to the distance between them. In 1764 he was appointed to a professorship at Pavia. After the suppression of the Jesuit Order he went to Paris in 1774, and received a pension from the King. In 1783 he went to Bassano, to superintend an edition of his works, on the completion of which he returned to Milan, but fell into a depression of spirits which at last grew into complete insanity. His works, which were the first to advocate in Italy the

theories of Newton, include dissertations on a great variety of important questions in mathematical and physical science, and were published collectively under the title, *Opera Perivtentia ad Opticam et Astronomiam* (5 vols, 1785). Consult M. Oster, *Roger Joseph Bosovich als naturs philosoph* (Bonn, 1909).

BOSE, bó'ze, JULIUS, COUNT (1809-94). A Prussian general, born at Sangelhausen. In 1861 he entered the Ministry of War, where he was active in the reorganization of the army. During the War of 1866 he conducted the celebrated night attack on Podol, which resulted in the retreat of the Austrian brigade. He was commander of the Eleventh Army Corps in the Franco-Prussian War, but, in consequence of severe wounds received at the battle of Worth (Aug. 6, 1870), he was prevented from further participation in that campaign.

BO'SHER, KATE LANGLEY (1865-) An American author. She was born in Norfolk, Va., graduated at the Norfolk College for Young Ladies in 1882, and after her marriage in 1887 resided in Richmond. Her *May Cary* (1910), *Miss Gibbie Gault* (1911), and *The Man in Lonely Land* (1912), won great popularity for their cleverly commingled humor and sentiment. In 1913 she published *The House of Happiness*.

BOSIO, bó'zyó, FRANÇOIS JOSEPH, BARON (1769-1845). A French sculptor. He was born at Monaco, March 19, 1769, and brought as a boy to Paris, where he studied under Pajou. Then he spent 17 years in Italy, as an enthusiastic student of the antique. Returning to Paris in 1808, he found a patron in Napoleon, who was disposed to encourage sculpture rather than painting. Of him and of his family, Bosio made many busts, as well as a statue of the Emperor for the Boulogne column and one of the King of Rome. Court favor was continued to him after the Restoration; he became sculptor to the King, and Charles X made him a baron. His mythological works, such as the "Aristæus" (1812), "Hyacinthus" (1817), and "Salmaeus" (1831), all in the Louvre, are characterized by classic form and smoothness without much truth to nature. His portraits are usually more realistic. Among his larger works were the bronze equestrian statue of Louis XIV for the Place des Victoires (his masterpiece) and the bronze quadriga of the Arc du Carrousel. Consult L. de Lomenie (Paris, 1844), Gouze, *La sculpture française* (Paris, 1895).

BOSNA-SERAI, bó'sna-sá-rí' See SARAJEVO. **BOS'NIA**. The southernmost province of Austria-Hungary. The name is officially applied to both the mountainous region known by this appellation and the lowlands of the Herzegovina on the south. The region thus defined has been an integral portion of the Austro-Hungarian monarchy since 1908. It is divided into six circles or administrative districts. Its area (with the Herzegovina) is estimated at 19,768 square miles.

Bosnia is bounded on the north and northwest by Croatia and on the west and south by Dalmatia and the Adriatic. Its eastern boundary coincides with Serbia's and Montenegro's western frontiers. Owing to the mountainous character of the northern portion of the province the name of Oriental Switzerland has been applied to it.

The elevated area lies in the zone of prolongation of the Dinaric Alps, which intervene between the province and the Dalmatian coast

land. Here some peaks attain 8000 feet in height. The uplift starts from the northern and western boundaries and spreads towards the east and the south, where it is fringed in part by valleys which extend to Serbia and Montenegro. The climate of the province is fairly uniform and may be described as cold-temperate. Mediterranean conditions prevail, however, in the Herzegovinian lowlands.

Bosnia is rich in natural resources. The relief of the land has prevented their speedy development, owing to the difficulty of providing arteries of communication. This obstacle, however, is being gradually overcome. A wide forest belt covers its central area from northwest to southeast. The southeastern slopes of the Bosnian ranges contain ores of silver, lead, copper, and iron. The last mineral in particular occurs in abundance. The valleys occurring between the mountains are exceedingly fertile and are well known for the charm of their scenery. The region between Travnik and Sarajevo is particularly noted in this respect. Bosnia is principally an agricultural country, agriculture engaging nearly 88 per cent of the population. The methods employed are of a primitive character, and extensive areas of fruitful land remain uncultivated. The chief European cereals are raised, and much attention is paid to the cultivation of fruits, especially plums, of which great quantities are exported in a dry state. Tobacco is an important product, the annual crop amounting to over 3000 tons. Sugar beets are also grown, and silk culture has been introduced. The yield of leading crops in Bosnia and the Herzegovina in 1910 and 1911 was as follows, in metric tons: corn, 250,000 and 213,700; wheat, 80,000 and 80,050; oats, 65,000 and 78,400; barley, 75,000 and 64,600; rye, 10,000 and 9600; potatoes, 137,300 and 63,300. The live stock of Bosnia and the Herzegovina and that of the Herzegovina alone were as follows in 1910: horses, 221,996 and 33,045; cattle, 1,308,753 and 147,336; mules and asses, 6721 and 4845; goats, 1,392,565 and 619,355; sheep, 2,488,854 and 852,525; swine, 527,223 and 33,787. The mountains of Bosnia are rich in minerals, some of which were worked in the days of the Romans. The mineral industry is chiefly in the hands of the government. The chief mineral products are iron, manganese, coal, and salt. The output of coal in 1910 was 706,659 tons and of iron ore 133,332. The manufacturing industries are also in a backward state and are confined chiefly to the production of coarse metal articles and some textiles for the home market. There are several extensive state tobacco factories. The exports consist mainly of cereals, fruit, animals, and animal products. After the Austro-Hungarian occupation the transportation facilities were extended and improved. At the beginning of 1911 there were in Bosnia and the Herzegovina 1215 miles of railway (a law of December, 1912, authorized important extensions) and 2549 miles of telegraph line, with 7940 miles of wire. The social and economic condition of Bosnia presents strange contrasts in the intermingling of institutions and customs handed down from the past with the innovations that reflect the spirit of modern progress.

The Treaty of Berlin (1878) recognized Bosnia and the Herzegovina as Turkish territory, but gave their administration to Austria-Hungary, and the latter finally annexed the terri-

tory, Oct. 5, 1908. The province is administered by the Bosnian Bureau, under the Austro-Hungarian Minister of Finance. The constitution of February, 1910, provides for a diet of 72 elected and 20 appointed members. The budget of 1911 showed estimated revenue and expenditure of 79,129,475 and 79,535,715 kronen, respectively. Military service is compulsory for every able-bodied male for a period of three years. Education is free, but not compulsory, and, although the number of schools, as well as the standard of instruction, has been raised since the Austro-Hungarian occupation, education is still very backward, and a large proportion of the population is illiterate. The census of Oct. 10, 1910, showed a population of 1,898,044 (994,852 male, 903,192 female), exclusive of 33,758 military. By circles the area and the population in 1895 and 1910 are stated as follows:

	Sq. km.	Pop. 1895	Pop. 1910
Sarajevo	8,405	228,107	298,061
Banjaluka . . .	9,018	329,499	403,817
Bihac	5,803	191,897	229,071
Travnik	10,116	240,088	284,661
Tuzla	8,918	358,990	425,496
Mostar*	9,189	219,611	267,038
	51,199 †	1,568,092	1,898,044 ‡

* The Herzegovina

† Equal to 19,768 square miles

‡ Increase over 1895, 21.04 per cent.

According to religion, the population in 1910 was: Servian Orthodox, 825,338 (showing an increase over 1895 of 22.59 per cent); Mohammedan, 612,090 (11.57); Roman Catholic, 434,100 (29.94); Greek Catholic, 8136; Spanish Jews, 8202; other Jews, 3655; Protestants, 6337.

The inhabitants (Bosniaks and Herzegovinians), Christian and Mohammedan alike, belong to the Serbo-Croatian branch of the Slavic race. In the necropolis of Glasine, with its 20,000 tumuli, were found crania which show that the dolichocephalic Hallstatt race was once as pronounced here as is the opposite type to-day. The language, "Bosnisch," is almost identical with the Servian (by the Roman Catholics it is written in Roman instead of Cyrillic letters). The Mohammedans, who call themselves Turks, are descendants of Slavic Christians converted to Islam during the Mohammedan conquest and do not adhere so closely to Islam as the Osmanlis. The Turkish element of the population is insignificant. There is an Albanian element in the south. The capital is Sarajevo, with a population of 51,919 in 1910. Other towns are: Mostar, 16,392; Banjaluka, 14,800; Tuzla, 11,333.

Bosnia constituted a part of the Roman provinces of Dalmatia and Pannonia and was celebrated in ancient times for its rich mines of silver and gold. After the passing of the Goths the region was occupied by a Slav population about the beginning of the sixth century. For a long time the various parts of the country had their own petty princes. The Bosnian rulers begin to figure under the name of Ban in the twelfth century. About this time the heretical Christian sect of Patarienes rose to importance. In the course of the Middle Ages the country passed through periods of Servian, Croatian, and Hungarian overlordship. A succession of powerful chiefs extended the limits of the principality over Dalmatia and a part of

Servia, and in 1376 Ban Tvertko proclaimed himself King of Bosnia. In 1401 came the beginning of Turkish invasion, which burst upon the country in all its force in 1463. The Turks now made themselves rulers of nearly the whole of Bosnia, and the fragment which had become attached to Hungary fell into their hands after the battle of Mohacs in 1526. Bosnia became thoroughly Islamized and submitted quietly to the ruthless Ottoman rule. In 1850-51 the Mohammedan nobility, crushed by the heavy weight of taxation, rose in arms against the Porte, but the revolt was stamped out with sanguinary efficacy by Omer Pasha. An unsuccessful insurrection in Bosnia and the Herzegovina took place in 1875-76, and was followed by Servia's disastrous war with Turkey. The facts of Turkish misgovernment were recognized at the Congress of Berlin (1878), and Austria-Hungary was authorized to occupy and administer Bosnia and the Herzegovina, though the Sultan retained the nominal suzerainty over them. The Austro-Hungarian occupation was effected in 1878, but only after a desperate resistance on the part of the Mohammedan inhabitants. In 1881 compulsory military service was introduced. From 1878 until 1908 the affairs of Bosnia and the Herzegovina were administered by the Austro-Hungarian Minister of Finance. This state of affairs was ended in 1908, when the Emperor Francis Joseph, taking advantage of the revolution at Constantinople and the Bulgarian declaration of independence, proclaimed the extension of the sovereignty of Austria-Hungary over the two provinces on October 7. This was a violation of the Treaty of Berlin and called forth remonstrances from Turkey and the Powers. Servia in particular, seeing her dreams of a Servian union frustrated, even began preparations for war. A few weeks of diplomatic negotiation, however, resulted in the assent of the Powers on the condition that Austria render some financial compensation to Turkey. A commission was appointed to prepare a constitution for the two states providing for an autonomous government. This was finally promulgated Feb. 22, 1910. It provides for a diet of 72 elected and 20 ex-officio members, and a president and two vice presidents, appointed yearly by the Emperor. The three great religious sects are to be represented in the presidential office in rotation—a Serb one year, a Mohammedan the next, and a Croat the third year. In the diet the Servians are allowed 31 representatives, the Mohammedans 24, the Croats 16, and the Jews 1. This division is on the basis of population. The diet has no authority in questions pertaining to the army or to customs duties, but in internal affairs, such as the negotiations of loans, civil and commercial law, and industrial and land questions, it has full power. All measures are, of course, subject to the sanction of the crown.

Consult: Lavrolev, *The Balkan Peninsula* (London, 1887); Miller, "Bosnia under the Austrians," *Gentleman's Magazine*, vol. cclxxxv (London, 1898), and *Travels and Politics in the Near East* (1899); Diehl, "En Bosnie-Herzégovine," *La grande revue*, vol. xvii (Paris, 1901); A. Bordeaux, *La Bosnie populaire* (Paris, 1904); G. Capus, *A travers la Bosnie et l'Herzégovine* (Paris, 1896); P. Coquelle, *Histoire du Monténégro et de la Bosnie* (Paris, 1895); F. A. Ogg, *The Governments of Europe* (New York, 1913); L. Geller, *Bosnisch-Herzegowinische Verfassungen*

und politische Grundgesetze (Vienna, 1910), F. Kumlossy, *Das Rechtsverhältniss Bosniens und des Herzegowina zu Ungarn* (Pressburg, 1911)

BOSPORUS, or **BOSPHORUS** (Gk Βόσπορος, *Bosporos*, literally *ox-ford*, from βόις, *bous*, ox, cow + πορος, *poros*, ford, crossing. Called also the Strait of Constantinople). The narrow channel which connects the Black Sea with the Sea of Marmora and separates the continents of Europe and Asia. (Map Turkey in Europe, G 4). It has a length of about 18 miles, and in width varies from about 1800 feet at its middle section to about 2 miles towards its northern end. Its depth is over 100 feet.

The surface currents are from the Black Sea to the Sea of Marmora, while underneath and along the shore the direction is opposite, which fact accounts for the undiminished salinity of the Black Sea, in spite of the great quantities of fresh water which it receives through its affluents. The swift currents and the occasional fogs which envelop the northern entrance make the channel very dangerous for navigation, and a number of lighthouses have been erected to insure greater safety. The shores are for the most part elevated and are lined with palaces, picturesque villages, gardens, and numerous ancient ruins. The bulk of medieval trade between Europe and Asia passed through the Bosphorus. The galleys of Genoa and Venice bringing western commodities to Black Sea caravan terminals where they would load products of the East passed over its waters. One of the world's most commodious natural harbors, the Golden Horn, lies at the northern end of the strait. At the middle, where it is about 2800 feet in breadth, Darius made his bridge of boats when he marched against the Scythians. The Bosphorus has been under Turkish control since the year 1461. Repeated European conferences, including that of Berlin in 1878, have confirmed the stipulation of a treaty made in 1841, providing that no ship of war belonging to any nation but Turkey shall pass through the Bosphorus without the consent of the Ottoman authorities. Consult Goryainov, *Le Bosphore et les Dardanelles étude historique sur la question des détroits* (1910).

BOSPORUS, KINGDOM OF An ancient Greek state on both sides of the Cimmerian Bosphorus (the Strait of Yenikale, connecting the Sea of Azov with the Black Sea). It was founded probably about the beginning of the fifth century B.C. in the Tauric Chersonesus (Crimea). In 393 the kingdom was extended along the Asiatic coast, and Theodosia was united with it. In 360 the kingdom became tributary to the Scythians. In 290. Towards the close of the second century B.C., Mithridates, King of Pontus, vanquished the Scythians and set his son, Machares, on the throne of Bosphorus. On the death of Machares, soon followed by that of Mithridates, the Romans gave the country in 63 B.C. to Pharnaces, the second son of Mithridates, and after his assassination to several princes who gave themselves out as descendants of Mithridates. When at last the family became entirely extinct, in 259 A.D., the Sarmatians made themselves masters of the kingdom. The capital of the kingdom was called Panticapæum. See KERTCH.

BOSQUET, bô's'kâ', PIERRE FRANÇOIS JOSEPH (1810-61). A marshal of France. He was born at Mont de Marsan, in the department of Landes, Nov. 8, 1810, entered in 1829 the Polytechnic School in Paris, and in 1838 joined the artillery

as sublieutenant. He became colonel in 1847, general of brigade in 1848, and general of division in 1854. In the earlier part of his career he displayed such skill and valor in several Algerian campaigns that he was intrusted with the Second Division of the French army in the Crimean War, 1854-55, in which he especially distinguished himself at the Alma, Inkerman, and at the storming of the Malakoff. Having been seriously wounded at Sebastopol, he was compelled to retire from active service, and France, in recognition of his services, made him senator and field marshal. The British Parliament voted its thanks to him in a special resolution.

BOSS, bôs (Fr *bosses*, probably OHG *bōzo*, tuft, bunch, *bōcan*, MHG, *bōzen*, to beat). In architecture, (1) a projecting stone serving as a keystone at the intersection of two or more vaulting ribs (as in English, German, and Spanish late Gothic vaults). Such stones are cross-shaped or circular and carved with foliage, a rosette, heraldic escutcheon, or even a human figure. By extension, any knob-like projecting carved ornament resembling a vault-rib keystone. (2) A projecting portion or block of uncut stone left to be later carved or cut away.—The boss of a bit is the ornament with which a bridle bit sometimes terminates each end of the mouth bar.

BOSS. A term derived from the Dutch *baas*, originally meaning a master, overseer, or superintendent of any kind. So a *boss* shoemaker or carpenter is the head of a gang of shoemakers or carpenters, who deals out work to them and fixes the amount of their pay. The term seems to have arisen from aversion to the word "master," regarded as savoring too much of the relations between master and slave, and it has come largely into use among the American negroes since their emancipation. In American politics, it denotes a professional politician who has secured control of certain appointive offices, and often of the machinery of nomination to elective offices, and hence is able to direct the course of legislation and administration to his own advantage. In the early period of American history the boss was commonly an officeholder who used his influence to reward his political friends and hence to perpetuate his hold upon his position. In the latter half of the nineteenth century the powers of the boss were vastly extended through the necessity of organizing politically the masses of immigrants in the great cities. Moreover, his opportunities for enrichment were much increased through the development of franchise values, the increase in magnitude of public contracts, etc., at the disposal of public administrations. From this time the boss ceased, as a rule, to be an officeholder.

While the boss has been for over a century a prominent figure in American political life, his malign influence and the conditions under which he establishes his power were not generally understood until after the exposure of the Tweed Ring in New York in 1872. Since that time the elimination of the boss has been the chief aim of political reformers, and many of the cruder methods employed by the earlier bosses have been outlawed. It cannot be said, however, that any plan of reform yet proposed would wholly destroy the political bosses. See TAMMANY HALL, TWEED RING.

BOSS. In geology, a nearly circular area of

intrusive rock within a different formation, usually sedimentary. The circular outline is the essential feature which distinguishes it from a batholith (q.v.), the latter being of very irregular shape. In diameter it may range from a few score feet to several miles. Bosses consist of the plutonic rocks like granite, syenite, diorite, and gabbro, which, originating in the unknown depths of the earth, have been forced towards the surface but have cooled and consolidated before actually coming to daylight, as do the volcanic rocks. Their present position at the surface is attributable to erosive agencies which have removed the original cover. Since they are made up of very hard rocks they very often project above the surrounding country in the form of hills that have a rounded contour. Bosses are of very common occurrence wherever the older crystalline rocks are developed, and are exemplified by many of the granite areas in New England, New York, and the States traversed by the Appalachian Range from New York to Alabama.

BOSS, LEWIS (1846-1912). An American astronomer. He was born in Providence, R. I., graduated in 1870 at Dartmouth College, and from 1872 to 1876 was astronomer of the United States northern boundary commission. In connection with the determination of the latitude of various specified points on the boundary line, he compiled a list of the *Declinations of Fixed Stars* (Washington, 1878), which forthwith made him favorably known. In 1876 he was appointed director of the Dudley Observatory at Albany, N. Y. He was chief of the expedition sent in 1882 by the United States government to Santiago, Chile, to observe the transit of Venus. He was State superintendent of weights and measures for New York from 1883 to 1906. In 1909 he became the editor of the *Astronomical Journal* and in 1911 was awarded the Lalande prize of the Academy of Sciences of Paris. His publications, besides many monographs, include a *Catalogue of 8241 Stars* (1890); *479 Southern Stars* (1898); *Solar Motion and Related Researches* (1901); *Positions and Motions of 627 Standard Stars* (1903); *Preliminary General Catalogue of 6188 Stars* (1910); *Catalogue of 1059 Standard Stars* (1910).

BOSSAGE (for derivation, see Boss). A term used in two senses: either (1) to denote the stones in a building left rough and projecting, afterward to be worked into a decoration, as in carved Gothic keystones (see Boss), or in memorial tablets; or (2) to designate stones left in the same rough manner as a permanent feature, as in the rustic masonry of Florentine palaces.

BOSSCHA, bōs'sā, JOHANNES (1831-1911). A Dutch physicist. He was born in Breda, and was educated in Deventer and Leyden. He became director of the Polytechnic School in Delft in 1878. He has made important investigations on galvanic polarization, the rapidity of sound waves, and the mechanical theory of electrolysis, and he was one of the first (1855) to suggest the possibility of sending two messages simultaneously over the same wire. His *Verspreide Geschriften* were published in 3 vols. (Leyden, 1902).

BOSSÉ, bōs, ABRAHAM (1602-76). A French engraver. He was born in Tours and formed his art chiefly under the influence of Jean de St. Ign and Claude Mellan. He is known as the best depicter of French life during the reign of

Louis XIII. He executed 1449 plates alone and 57 in conjunction with other masters. (Consult the catalogue of his works by Du Plessis, Paris, 1859.) Most of these are after his own designs, in a free and spirited style, etched and then finished with the graver. The last years of his life were devoted to teaching perspective, of which he became professor. Consult his biography by Valabreque (Paris, 1892).

BOSSÉ, bōs'sé, ROBERT (1832-1901). A German statesman. He was born at Quedlinburg, and studied law at the universities of Heidelberg, Halle, and Berlin. He became Under-secretary of State in the Ministry of the Interior in 1889, in which capacity he had the principal share in the preparation of the laws providing insurance for workmen. In 1891 he was appointed Secretary of State in the Imperial Ministry of Justice, and he was chairman of the commission intrusted with the preparation of the new Civil Code of Germany. He was appointed Prussian Minister of Education in 1892 and retired in 1899. In 1883 he became editor of the *Monatsschrift für deutsche Beamte* (Berlin). He published: *Grundzüge konservativer Politik in Briefen* (1868), *Kommentar zum Invaliditäts- und Altersversicherungsgesetz* (3d ed., 1891); *Eine Dienstreise nach dem Orient* (1900).

BOSSI, bōs'sā, ENRICO MARCO (1861-). An Italian composer, born at Salò. He studied at the Milan Conservatory, became organist in the cathedral of Como, and professor at the Conservatory of Naples. From 1895 to 1902 he was director of the Conservatory at Venice, and from 1902 to 1913 director of the Liceo Musicale at Bologna. As a composer he ranks among the foremost living masters of Italy. His works include three operas, a Symphonic Concerto for organ and orchestra, a Requiem, *Canticum Canticorum* (a biblical cantata), *Il Paradiso Perduto* (symphonic poem with chorus), and fine organ and chamber music.

BOSSI, GIUSEPPE (1777-1815). An Italian painter and author. He was born at Busto Arsizio, Aug. 11, 1777, and studied in the Academy of Milan with Apiani, and afterward at Rome. On his return to Milan he was appointed secretary of the Brera Gallery, the foundation and organization of which is his greatest achievement. He was also instrumental in founding the important Museo Archeologico of Milan. He possessed a valuable collection of the drawings of the old Italian masters, upon which subject he was the greatest authority of his day. He is still famous as the discoverer of the celebrated Venetian sketch-book, attributed to Raphael (q.v.). Bossi's cartoon of Leonardo da Vinci's "Last Supper" (1807), now in the Museo Archeologico, was used by Raffaelli as a model for his celebrated mosaic reproduction of the subject. At the same time he wrote an interesting treatise, *Del cenacolo di Leonardo da Vinci* (1810). His last work was a series of monochrome mural paintings representing the life of Leonardo in the Villa Melzi on Lake Como. Paintings and drawings by him are in the Brera, the Gallery of Parma, the Museo Archeologico, and elsewhere. After his death a marble statue by Canova was erected in his honor in front of the Ambrosian Library in Milan.

BOSSI, LUIGI, COUNT (1758-1835). An Italian antiquary and historian. He was born in Milan, studied in Pavia, and became a canon

of the cathedral of Milan, but when the French entered Italy he took the side of the invaders, and was appointed by Bonaparte agent of the French government in Turin, and afterward (1803) prefect of the archives of the Kingdom of Italy. He was an extremely prolific author and produced more than 80 works on antiquarian, historical, and art subjects. The best known of his antiquarian writings is *Observations sur le vase que l'on conservait à Gènes sous le nom de Sacro Catino* (1807). His most important historical works are a much-enriched translation of Roscoe's *Life of Leo X* (12 vols., 1816-17), *Vita di Cristoforo Colombo* (1818, Fr trans., 1824), *Storia d'Italia* (20 vols., 1816-23), and *Storia della Spagna* (8 vols., 1821-22).

BOSSUET, bô'swâ', JACQUES BÉNIGNE (1627-1704). A distinguished French preacher. He was born Sept 27, 1627, in Dijon, received his earlier education in the Jesuit College there, and then went to Paris to the College of Navarre, where he studied the Sacred Scriptures, the works of classical antiquity, and the Cartesian philosophy. In 1652 he was made a priest, and a doctor of theology, and canon in Metz. Here he was called by the bishop to reply to the catechism of the Protestant minister, Paul Ferri, and thus he did (1655) in a way that commanded the admiration even of Protestants. He soon attained great distinction as a pulpit orator, and in 1661 he was made preacher to the court. His discourse on the occasion of Marshal Turenne's conversion to the Catholic church obtained for him the bishopric of Condom (1669). Louis XIV having in 1670 intrusted to him the education of the Dauphin, he resigned his bishopric in 1671, because he believed that he would be unfaithful to his duty if he retained it during a continued absence from his diocese. He was now made a member of the Academy. The care with which he attended to the education of the Dauphin was rewarded, in 1680, by his nomination as first almoner of the Dauphin, and in 1681 by his appointment to the bishopric of Meaux. He was the author of the four articles which secured the freedom of the Gallican church, and the privileges claimed by the King against the prerogatives of the Pope, and his eloquence in the famous assembly of the French clergy in the year 1682 secured the adoption of these articles. In 1697 he became a member of the Council of State, and in the following year first almoner to the Duchess of Burgundy. He spent the last year of his life in his diocese, but died in Paris, April 12, 1704. He was alike strict in morals and in religious doctrine, his strictness in the latter he showed particularly in his controversy with Fenelon, whom he accused of heresy for his defense of the Quietists, although at least in early life he had dreamed of a reconciliation of Catholics and Protestants. Bossuet is considered the greatest ecclesiastical orator known in history. His orations at the funerals of the Duchess of Orleans and the great Condé are particularly famous as masterpieces of this kind of eloquence. All his writings attracted much attention. For the defense of those dogmas of the Catholic church which are rejected by the Protestants he wrote his *Exposition de la doctrine de l'église catholique sur les matières de controverse* (Paris, 1671).

His greatest controversial work is his celebrated *Histoire des variations des églises protestantes* (2 vols., 1688), in which he founds his

arguments chiefly upon the doctrinal diversities of the churches of the Reformation. To the defense of the four articles of the Gallican church he devoted his *Defensio Declarationis Celebrissime, quam de Potestate Ecclesie Sanctæ Cælius Gallæus a* [1682] (2 vols., 1730). With a view to the instruction of the Dauphin, he wrote his *Discours sur l'histoire universelle jusqu'à l'empire de Charlemagne* (1681), a work particularly deserving of notice, as the first attempt at a philosophical treatment of history. The continuation of it to the year 1661 (1805) is entirely derived from materials which he left behind him but to which the last touch of his own hand was wanting. Another fruit of his political and historical studies was the *Politique tirée de l'Écriture Sainte* (1709). There are modern English translations of the following: *Select Sermons and Funeral Orations* (3d ed., London, 1801), *A Conference on the Authority of the Church* [1679] (1841), *A Survey of Universal History* (1819), *Elevations to God* (1850), *An Exposition of the Catholic Faith* (new ed., 1841), *The History of the Variations of the Protestant Churches* (2d ed., 2 vols., Dublin, 1836), *Sermon on the Mount* (New York, 1900), *Meditations* (London, 1901). His works appeared in Paris (31 vols., 1862-66), appendix *Œuvres inédites* (2 vols., 1881-83). For his life, consult A Reaume (3 vols., Paris, 1869-70), G Lanson (Paris, 1891), *Rebellion, Bossuet, historien du protestantisme, Etude sur l'histoire des variations* (Paris, 1892, new ed., 1905), Ledieu (Bossuet's secretary), *Mémoires et journal sur la vie et les ouvrages de Bossuet* (4 vols., Paris, 1855-57), Mrs H L Sidney Leai (London, 1880), Currier, *Nine Great Preachers* (Boston, 1912).—His nephew, JACQUES BOSSUET, died Bishop of Troyes, July 12, 1743. His very extensive correspondence, chiefly devoted to the elucidation and investigation of the views of Fenelon, is included in the above-mentioned edition of the works of his uncle.

BOSSUT, bô'sû', CHARLES (1730-1814). A French mathematician and physicist, born at Tartaras, near Lyons. He studied with the Jesuits in Lyons and received his ordination. In 1752 he became professor of mathematics at Mezières and in 1768 was received into the Academy of Sciences. The Revolution deprived him of his situation and his income, and he lived in the greatest seclusion till under the Empire he was appointed a professor in the Polytechnic School. His works are very numerous. The following may be mentioned as particularly valuable: *Recherches sur la construction la plus avantageuse des digues* (1764), *Recherches sur les altérations que la résistance de l'éther peut produire dans le mouvement des planètes* (1776), *Nouvelle expérience sur la résistance des fluides par d'Humbert, Condorcet, et Bossut* (1777), *Traité élémentaire de mécanique et de dynamique* (1763), *Cours complet des mathématiques* (7 vols., 1795-1801), *Cours de mathématiques à l'usage des écoles militaires* (1782), *Essai sur l'histoire générale des mathématiques* (2d ed., 1810), and *Traité du calcul différentiel et intégral* (1798). He was a great admirer of Pascal, and edited his works (15 vols., Paris, 1779), to which he prefixed an introductory *Discours sur la vie et les ouvrages de Pascal*, in 5 vols. Bossut is especially entitled to fame for his researches in experimental hydrodynamics, which have formed contributions of great importance to that science. He is best known,

however, for his history of mathematics mentioned above—a work which, while open to serious criticism, awakened much interest in the subject.

BOSTAN'GI, bōs-tān'ji (from Turk. *bostan*, Pers. *bustān*, garden). A class of men in Turkey who, originally the Sultan's gardeners, now perform a variety of duties, such as mounting guard at the seraglio and rowing the Sultan's barge. Their chief, called Bostangi Bashi, holds the rank of pasha, is governor of the Sultan's residences, and chief of police of the capital. The bostangi at one time numbered 3000, and were united with the janissaries in military duty. In war time their strength was 12,000. Their present number is about 600.

BOSTON, bōs'ton or bōs' (-"St. Botolph's town"). An ancient English borough and seaport in Lincolnshire, on both sides of the Witham (4 miles from its mouth), 28 miles southeast of Lincoln (Map: England, F 4). Boston is supposed to be the ancient Icanhoe, the site of the abbey founded by St. Botolph in 654. After the Conquest it became an important trading town and the home of a Hanseatic guild until about 1470. Henry VIII granted it a charter of incorporation in 1546. The ancient Guildhall is interesting historically as the place of trial of Brewster and his companions. The parish church of St. Botolph (1309), 200 × 98 feet, is one of the largest without cross aisles in England, and has a fine tower 290 feet high, surmounted by a lantern visible 40 miles out at sea. Its decorated chapel was restored in 1857 by citizens of Boston, Mass., in memory of John Cotton, who was a vicar in the English town before he came to America. Boston returns one member to Parliament. The town owns extensive docks, which are very profitable. The clearing of the river of silt and the closing of the adjacent fens have greatly promoted the trade of Boston. Pop., 1891, 14,570; 1901, 15,700; 1911, 16,873.

BOSTON. The capital of Massachusetts, and the county seat of Suffolk County, the commercial metropolis of New England, and the fifth city of the United States in population (Map: Massachusetts, E 3). It is in lat. 42° 21' 27" N., long. 71° 3' 30" W., 232 miles by rail northeast of New York City, on Boston harbor, an arm of Massachusetts Bay, at the mouths of the Mystic and Charles rivers.

Description. The original site of Boston was a peninsula marked by three hills, of less than 800 acres in extent, cut into by inlets of ocean and river, coves, and creeks, the deeply indented shore surrounded by tidal marshes, and connected with the mainland by an exceedingly narrow neck, one mile in length and so low that it was not infrequently submerged. One of the three hills, named by the settlers Beacon, Copp's, and Fort respectively, has been leveled, and the other two, Beacon and Copp's, have been considerably cut down, though the former still rises to a height of 110 feet. The inlets, coves, and tidal marshes have been from time to time filled in and reclaimed at great expense until the original area of 783 acres has been expanded to 1801 acres, a part of which, covering what was the basin of the Charles River, is now the location of the well-known Back Bay district of the modern city. The limits of the original town have been extended at various periods to include Noddie's Island in the harbor, "laid to Boston" in early Colonial times (1636) and afterward

named East Boston; Dorchester Neck, annexed in 1804, and becoming South Boston; Washington Village, set off from Dorchester, 1855, Roxbury, annexed in 1868; Dorchester, in 1870; Charlestown, West Roxbury, and Brighton, in 1874; and Hyde Park in 1912—the modern Boston occupying a total area of 30,295 acres, or about 47.30 square miles.

The appearance of the old town is still slightly retained in the narrow and irregular streets of the North End, now one of the foreign quarters of the city, mainly an Italian centre. As historical relics remain four old burying grounds—King's Chapel Burying Ground, the oldest cemetery in Boston, dating from 1630, in which are the graves of the Winthrops and numerous other Colonial worthies; the Granary Burying Ground, 1660, containing the graves of Samuel Adams, James Otis, Peter Faneuil, Paul Revere, and other persons noted in history; Copp's Hill Burying Ground, the earliest also dating from 1660, where are the tombs of the Mathers, Increase, Cotton, and Samuel; and the Central Burying Ground, on Boston Common, 1756, a notable grave in which is that of Gilbert Stuart, the portrait painter. A few old buildings are still standing—Christ Church (Old North Church, so called) (1723), from the spire of which, as it is marked—though this has been violently disputed—were hung the lanterns for Paul Revere; Faneuil Hall (q.v.); the Old State House (1748), restored in 1882 and 1908–09 as nearly as possible to its provincial appearance, one of the most noteworthy historic buildings in the United States and the repository of an interesting collection of relics and paintings; King's Chapel (1754), occupying the site of the first Episcopal church, of 1688; and the Old South Meeting House (1729), with which are connected many notable events in the history of the city, and which now contains historic relics and in winter is used as the hall for lectures on American history. The interior of Christ Church and the exterior of the Old South have also been restored to their original aspect.

The modern city has about 570 miles of accepted streets, of which all are paved—the greater part with macadam, granite block, gravel, and asphalt. In the newer sections they are handsomely laid out. Beacon Street and Commonwealth Avenue, the latter 240 feet wide and one of the finest boulevards in America, with other streets of the Back Bay region, are representative of the beauty of Boston's residential avenues. Washington, Tremont, and Boylston streets are the headquarters of the retail trade, and State Street is the financial centre, the Wall Street of Boston. Intercommunication between the various districts is afforded by an efficient street-railway system which operates upward of 400 miles of track, elevated and surface railways, subways, and tunnels, and a number of bridges; East Boston being connected by ferry and by a tunnel under the harbor.

Buildings. Boston is replete with objects of architectural interest. The State House, on Beacon Hill, the front built in 1795 after designs by Charles Bulfinch, and subsequently enlarged and extended at various times, is a prominent structure, some 400 feet long, the "Bulfinch Front" crowned by a gilded dome. The Shaw Monument, by Saint-Gaudens; the reproduction of the First Independence Monument, by Bulfinch, which was erected in 1790;

and statues of Daniel Webster, Horace Mann, Gen Joseph Hooker (equestrian, the figure by Daniel C French), Charles Devens (Olin L Warner), and Nathaniel P Banks (H H Kitson), are of interest in this locality. The City Hall, an Italian Renaissance structure, on School Street, is fronted by statues of Benjamin Franklin and Josiah Quincy. In the rear, and facing Court Street, is the City Hall Annex, with lofty pillared front, erected in 1912-14. The granite County Courthouse near by, on Pemberton Square, a type of German Renaissance, is 450 feet long, erected at a cost of \$2,500,000. On State Street stands the Customhouse, the original building, dating from 1847—a massive pillared structure of granite, in form a huge Greek cross—reconstructed, the dominating feature being a broad lofty tower rising from the domed roof of the original. Not far distant, facing Post Office Square, is the United States Government building, which covers an entire block and accommodates the post office, sub-treasury, and United States courts. The total cost of this edifice, including construction and land, was nearly \$6,000,000.

Copley Square, Back Bay, is perhaps the city's chief architectural centre. Here are the Public Library, facing the square, the Copley-Plaza Hotel and Trinity Church on the south side, the New Old South Church, and the Wesleyan Building, north side. The library (McKim, Mead, and White) is built of Milford granite, in Italian Renaissance style, and is nearly square, inclosing an open court which contains a fountain and is surrounded by a fine arcade. Over the main entrance are reliefs by Saint-Gaudens, and on the entrance platform, statuary groups representing, respectively, Science and Art, by Bela L. Pratt, while the interior is richly decorated with colored marbles and mural paintings by well-known artists, among them Puvis de Chavannes, Abbey, and Sargent. The entrance hall leads to a magnificent marble staircase flanked with lions. A statue of Sir Harry Vane adds to the interior decoration. The Boston Public Library is the second largest free circulating and reference library in the country. It has accommodation for 2,500,000 books and contains upward of 1,000,000 volumes, among which are included several valuable special collections, that of Shakespeariana being one of the finest in the world. The general reading room (Bates Hall) is 42 feet wide by 217 feet long and extends across the Copley Square front. The churches on this square are worthy examples of ecclesiastical architecture, and, with the Roman Catholic Cathedral of the Holy Cross in Washington Street, the Arlington Street Church, the First Baptist (originally Brattle Square Church, Unitarian, by Richardson) on Commonwealth Avenue, and the First Church of Christ (Scientist), are perhaps the most striking church edifices in the city. The New Old South Church is in Italian Gothic with a fine campanile and an interior noticeable for its rich marble. Trinity Church, by Richardson, said to be the finest church in New England, is of French Romanesque. It has the form of a Latin cross and is particularly notable for its beautiful interior decorations and stained-glass windows. Other structures of interest are the Stock Exchange Chamber, the Chamber of Commerce, the Boston Athenæum, the New England Historic Genealogical Society's buildings, the Unitarian and

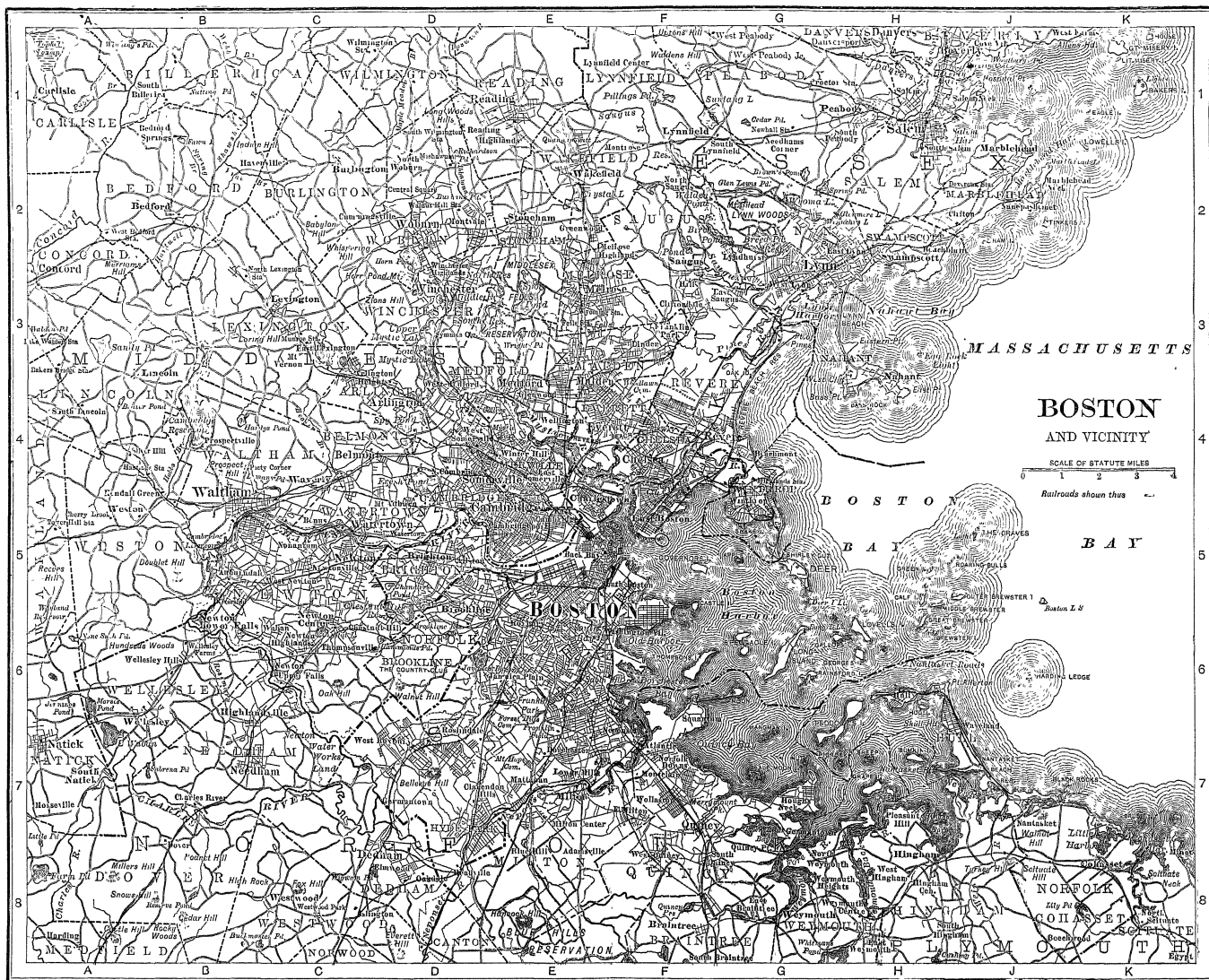
Congregational buildings, Ford Hall, Tremont Temple, and the Masonic Temple in the older and business parts, the Armory of the Independent Corps of Cadets, the Youth's Companion Building, and the Franklin Union (established from the fund created by a bequest of Benjamin Franklin to Boston), in the South End, and in the Back Bay district, the Natural History Museum, with a library and valuable collections, the buildings of the Massachusetts Institute of Technology, of the Massachusetts Historical Society, the New England Conservatory of Music, the Young Men's Christian Association, the Museum of Fine Arts (Guy Lowell, architect)—the repository of works of inestimable value, the collection of Japanese art being the largest and that of antique casts among the best in the world—the Wentworth Institute, Simmons College, and the Harvard Medical and Dental schools, the former comprising a noble group of five white marble structures, and constituting the centre of a collection of hospitals also largely of marble.

In Charlestown are the famous Breed's Hill and Bunker Hill. In this section of the greater city the principal points of interest are the Bunker Hill Monument, a granite obelisk 220 feet high, which affords from the top an extensive view, and the Navy Yard, occupying nearly 90 acres, and containing machine shops, ship houses, etc., and a large granite dry dock. Charlestown has also statues of Col William Prescott and Gen Joseph Warren, a soldiers' monument, and a monument to John Harvard. A large statue of Warren (by Paul W Bartlett) is in Roxbury, near the site of his birthplace there.

Parks. The Common, a most characteristic feature of Boston, esteemed by the people as few other public parks are because of its intimate connection with the history of the city, was set off in 1634 as a training field and common ground and has since been carefully preserved for public use. Its 48 acres are crossed by paths shaded by old elms and maples. Towards the centre, near where an historic Great Elm stood until blown down in 1876, is the Army and Navy Monument (by Martin Milmore), erected in memory of the men of Boston who fell in the Civil War. Near the Tremont Street (Lafayette) Mall stands the Crispus Attucks Monument (by Robert Kraus) commemorating the "Boston Massacre of 1770." A bronze figure represents Revolution breaking the chains, and the scene of the massacre is portrayed in bas-relief on the base, the names of the victims are on the shaft. Adjacent to the Common is the Public Garden, of 24 acres, the entrance to the Back Bay district, tastefully laid out and in season a mass of brilliant flowers. It contains an artificial lake, spanned by a bridge, an equestrian statue of Washington by Ball, statues of Charles Sumner (by Ball), William Ellery Channing (Herbert Adams), and Edward Everett Hale (Bela L. Pratt), a representation of "Venus Rising from the Sea," and the Ether Monument, a group by J. Q. A. Ward, commemorating the discovery of ether, first successfully used in 1846 by Dr. Morton, in an operation at the Massachusetts General Hospital.

Other noteworthy statues in various parts of the city include figures of Samuel Adams (by Anne Whitney) in Adams Square, of Governors Andrew (Ball) and Wolcott (French) in the State House, of Alexander Hamilton (Rimmer),





John Glover (Milmore), William Lloyd Garrison (Warner), and Leif Ericson (Anne Whitney), in Commonwealth Avenue; Governor Winthrop (Greenough), at the side of the First Church, Marlborough Street; Phillips Brooks (Saint-Gaudens), beside Trinity Church; Beethoven (Crawford), in the New England Conservatory of Music; Columbus (Buyens), in front of the Roman Catholic Cathedral; Admiral Farragut (Kitson), in Marine Park; Edward Everett (Story), Edward Everett Square, Dorchester district; and memorials to John Boyle O'Reilly (French), and Patrick A. Collins (Mr. and Mrs. Kitson), Back Bay Fens.

Owing to the natural beauty and accessibility of its suburbs, and the existence of the Common and the Public Garden in the heart of the city proper, Boston was late in initiating a system of public parks. There are now two phases of park development—the municipal, dating from 1875, and the metropolitan, of later inauguration and of vast extent. The municipal system of over 2400 acres includes, besides numerous playgrounds, open-air gymnasias, and independent parks in various parts of the city, a chain of parks connected by fine parkways, and almost encircling the city from the Charles River Esplanade to the Marine Park in South Boston. From its terminus at the Charles River, the system extends through a narrow section, Charlesgate, to the Back Bay Fens, thence by the Riverway to Olmsted Park and parkways to Jamaica Pond; through the Arnold Arboretum, where may be found every tree and shrub that will grow in Boston's climate; thence to Franklin Park, of 627 acres, between Roxbury, West Roxbury, and Dorchester districts, the central feature of the system, with a Zoological Garden; and ending at the Marine Park and Aquarium, at City Point, South Boston. The Marine Park is connected by a bridge with Castle Island, a part of the park system, as is also Governor's Island. This locality is a popular headquarters for yachts and affords facilities for boating and bathing (municipal bath houses). The Metropolitan Parks district, in which are included, with Boston, 38 municipalities, is administered by a commission of five members, appointed by the Governor. The scheme comprises such reservations as the Blue Hills (4900 acres), Middlesex Fells (1900 acres), Stony Brook Woods (460 acres), connecting the first named with the Boston municipal system at the Arnold Arboretum, Lynn Woods (2000 acres), Beaver Brook and Waverley Oaks Reservation (58 acres), of greater interest than its small extent presupposes, Revere Beach (67 acres), which is open to public use for several miles, Nantasket Beach (25 acres), and improvements along the Charles, Mystic, and Neponset rivers: a total of reservations and parkways of 10,214.86 acres.

Education, Libraries, etc. Boston is noted as one of the greatest educational and literary centres of the country. Its public-school system comprises, besides kindergarten, primary, and grammar schools, a liberal number of high schools; special high schools of the mechanics' arts, the practical arts, and of commerce; girls' trade and boys' industrial schools; and also normal and Latin schools. The Boston Latin School, founded in 1635, and the English High School occupy the largest school building in the United States. Among the higher institutions of learning are Boston University (Methodist Episcopal), Boston College (Roman Catholic),

Massachusetts Institute of Technology, the Medical and Dental schools of Harvard University, Tufts College Medical School, College of Physicians and Surgeons, St. John's Ecclesiastical Seminary (Roman Catholic), and the Massachusetts College of Pharmacy. The New England Conservatory of Music has an enviable reputation, and the Lowell School of Design, the Massachusetts Normal Art School, and the school connected with the Museum of Fine Arts are representative of Boston as a centre of art education. Besides these regular institutions, the great system of free lectures on a wide variety of subjects practically constitutes a great university. The work of the Lowell Institute (founded in 1839, by the will of John Lowell, Jr.), which is specially endowed for this purpose, is particularly worthy of note. The lectures in the Old South Meeting House have been mentioned.

The Boston Public Library maintains 250 agencies, including 13 branch stations with large permanent collections, besides numerous reading rooms and delivery and deposit stations. Within a radius of 15 miles from the State House more than 5,000,000 volumes in free or institutional libraries are publicly available. Among other noted collections in the city are those of the American Academy of Arts and Sciences (founded in 1780), the Boston Athenaeum (founded 1807) with over 240,000 volumes, Boston Library Society, Congregational Library, Massachusetts Historical Society (founded 1791), Massachusetts Horticultural Society (founded 1829), New England Historic Genealogical Society (founded 1844), State Library, Social Law Library, General Theological Library, and Natural History Society, besides those of the leading educational institutions.

Charitable Institutions. In the number and efficiency of institutions of this class, both public and private, Boston holds high rank. Among these mention may be made of the Massachusetts General Hospital (founded 1799), one of the best equipped in the world; Boston City Hospital, comprising 26 buildings; Massachusetts Homeopathic Hospital, Carney Hospital (in South Boston), Women's Charity Club Hospital (in Roxbury), Massachusetts Charitable Eye and Ear Infirmary, New England Hospital for Women and Children, Boston Insane Hospital (separate establishments for men and women), Children's and Infants' Hospitals, the Horace Mann School for Deaf-Mutes, and the Perkins Institution for the Blind (removed from South Boston to Watertown in 1913), the latter having a large library of raised-character books. On islands in the harbor are the principal almshouse, House of Correction, and House of Refuge for Boys.

Theatres, Clubs, Societies, Hotels. The Boston Theatre, seating 3000, is the largest in New England, and the Colonial, Tremont, Hollis Street, Shubert, Park, Castle Square, Keith's, Majestic, Plymouth, Cort, and Wilbur theatres have seating capacities ranging from 1000 to 2000. The Boston Museum, torn down in 1903, was noteworthy for the first appearance of famous actors and for the excellence of its stock companies; also as the oldest in the city. The earlier Tremont Theatre, which occupied the site of the present Tremont Temple, was notable in its day for the eminent players who appeared on its stage. The celebrated Boston Symphony Concerts are given in Symphony Hall, one of the

finest music halls in the country, while permanent opera is established in the Boston Opera House. See BOSTON SYMPHONY ORCHESTRA.

Boston is the home of a large number of historical, scientific, literary, and musical societies. In the last-mentioned class are such distinguished organizations as the Apollo, Cecilia, Harvard Musical, Handel and Haydn, and Orpheus. The social and literary clubs include, among numerous others, the Somerset, Union, St. Botolph, University, Puritan, Boston Art, Algonquin, Harvard of Boston, Athletic, Exchange, City, Engineers, Architectural, Tavern, Appalachian Mountain, and the Chilton, Mayflower, College, and Women's City (the last four women's clubs).

The principal hotels include the Copley-Plaza, Adams House, Parker House, Young's Hotel, Hotel Touraine, Somerset, Vendome, Westminster, Copley Square, Lenox, Thorndike, Brunswick, Belvedere, and Essex.

Commerce and Industry. Boston is the terminus of the Boston and Maine, and the New York, New Haven, and Hartford Railroad systems; the Boston and Albany, and the Boston, Revere Beach, and Lynn (narrow-gauge) railroads. There are two large union stations on the water fronts and on opposite sides of the business district—the North Station, used by the Boston and Maine system, and the South Station, one of the largest stations in the world, over 800 feet long by 700 feet wide, used by the Boston and Albany and the New York, New Haven, and Hartford system. There are several regular steamship lines to Europe. The harbor is spacious and safe. It is about 8 miles wide and more than twice as long, with a minimum depth in the main channel of 23 feet at low tide. There are several lights and beacons and numerous islands, upon certain of which are situated the old Fort Independence and Forts Warren and Winthrop, and the modern forts Standish and Strong, besides the charitable and reformatory institutions already mentioned.

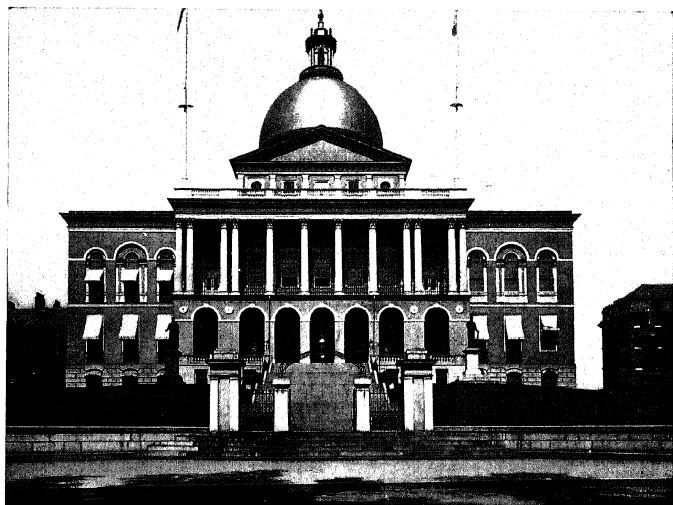
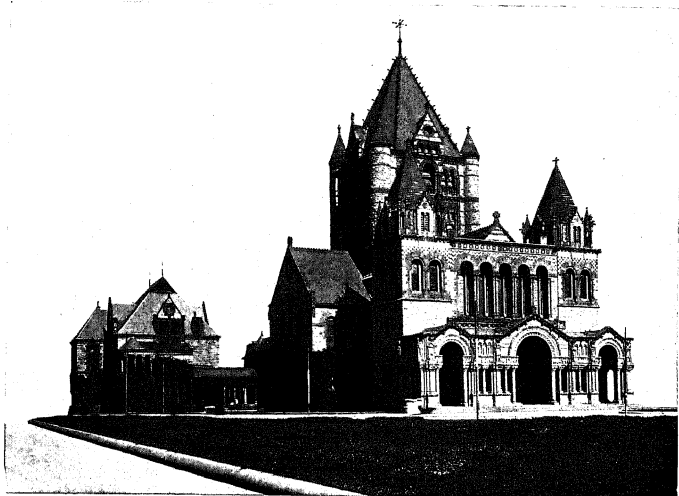
Boston's interests, once chiefly commercial, have become now mainly industrial, though the factories owned by Boston capital are mostly out of town, the manufactures are extensive and varied. According to the census of 1910 a total of over \$211,000,000 was invested in the various manufacturing industries, which had a production valued at nearly \$237,500,000. The city is the second wool market in the world, and the second fish market, ranking next to London in both, and is second to New York only among American ports in the value of its foreign trade, which amounted in 1912 to \$216,310,809. The exports comprised chiefly provisions (including animals), breadstuffs, meat and dairy products, cotton and its manufactures, leather and its manufactures, iron and steel manufactures, wool and its manufactures, printing paper and paper manufactures, distilled spirits, manufactures of rubber, and agricultural implements. The principal imports were wool and woollen manufactures, fibres, sugar, hides and skins, cotton and cotton manufactures, chemicals, drugs and dyes, manufactures of iron and steel, india-rubber and substitutes, tea, tin, wood and wooden products, fruits, fish, wood pulp, paper stock, hemp, flax, jute earthenware and china ware. The facilities for handling this great traffic are excellent, a system of freight terminals brings together the railroads and

ships, deep-water piers making accessible docking facilities for the largest vessels. The fishing industry, which formerly was one of the chief sources of Boston's prosperity, is still of importance, the city remaining the largest fish market in the country. Boston is the centre of immense mining, railroad, and insurance interests, which are operated all over the country.

Administration, Municipal Activities. On Nov. 2, 1909, as the result of a report made by a Finance Commission, the city adopted an amended charter which provided a quasi commission form of government. Under this charter the term of the mayor is four years, with the privilege of recall at the end of two years by not less than a majority of all the registered voters. There is a city council with one chamber of nine members elected at large for three-year terms, three elected each year, nominated, as is the mayor, by petition of not less than 5000 voters. The school committee, consisting of five members for three-year terms, two elected each year, is also nominated by petitions of not less than 5000 names. Appointment of all heads of departments and municipal boards (except those officially by law appointed by the governor of the State) are made by the mayor without confirmation by the city council, but subject to approval or certification of the appointee's qualification by the State civil service commission. A finance commission, of five members—residents and qualified voters of the city, but appointed by the governor of the State for five-year terms, one member appointed annually—is provided, whose duties are to investigate any matters relating to appropriations, loans, expenditures, accounts, and methods of administration affecting the city, or any department of it, that may appear to the commission to require investigation, and to report thereon to the mayor, the city council, the governor, or the legislature. Under this charter it was made a criminal offense for a member of the city government to participate in the profits of any city contract.

There has been of recent years a great increase in the activities undertaken by the municipality. These now extend to a municipal printing plant, work in the repair and construction of city buildings, watering of the streets, municipal bath houses, lectures, and concerts, free excursions for children, a camp for boys, etc. Besides these, and the greatest of municipal enterprises—the subways and tunnels—there are the combined municipal works comprised in the metropolitan systems of parks, of sewerage, and of water supply. The metropolitan districts are not, however, coextensive with the parks district comprising, with Boston, 38 cities and towns, the sewerage, 24, and the water district, 17. The sewerage system comprises a network of common and intercepting sewers (820 miles in Boston), discharging into Boston harbor. The water supply is obtained from the Naubna River, and the plan is arranged to include other sources in case the demand exceeds the present supply. The first water works of the system were completed in 1848. The entire system, including 828 miles of supply and distributing mains, has cost above \$23,000,000.

The original subway, constructed in 1895-98 at a cost of \$4,250,000, was the finest example in the United States of municipal enterprise in this field—a notable work of engineering undertaken for the relief of the congested traffic in



BOSTON
TRINITY CHURCH (UPPER)
THE NEW STATE HOUSE (LOWER)

the business district. It was opened for traffic in September, 1897, when it was leased for operation to a private company for a term of 20 years at an annual rental of 4½ per cent of the net cost of the work. This Tremont Street Subway is substantially constructed, is well lighted and ventilated, and is attractively finished at the stations with glazed white brick. On Dec. 30, 1904, the East Boston Tunnel, passing beneath Boston harbor to East Boston and affording eastern suburban street cars direct access to the city, was put in use. On this tunnel the operating company pays the city 4½ per cent per annum on the net cost of construction. On Nov. 30, 1908, the Washington Street Tunnel was opened to the public and put into service exclusively for elevated trains, which before had been run together with surface cars in the Tremont Street Subway. It is leased to the operating company, for 25 years from the date of beginning of use, at 4½ per cent of the net cost. The elevated system, which is in connection with the surface systems south and north, was opened in 1901, when it extended from the Roxbury district through the city northward and through the Charlestown district, connecting with both the North and South terminal railway stations. In 1911 it was extended through Roxbury southward to Forest Hills, West Roxbury district. The structure is of steel, and the trains are operated by electricity, on the third-rail system. On March 23, 1912, the Cambridge connection, comprising a tunnel through Beacon Hill to an open way over Cambridge Bridge into the Cambridge Main Street Tunnel (built by the operating company), was opened, leased at an annual rental for 20 years at 4½ per cent upon the net cost, and thereafter at 4½ per cent. In 1912 began the construction of the Boylston Street Subway, starting from about the junction of Commonwealth Avenue and Beacon Street, Back Bay, and making connection with the Tremont Street Subway; the Dorchester Tunnel, from the Tremont Street Subway to the Dorchester district; and the East Boston Tunnel Extension, on the Boston side. These three works when completed are also to be leased to the operating company for 20 years at a yearly rental of 4½ per cent on the net cost. The elevated and surface lines of the city are all operated by the Boston Elevated Railway Company, and the various subways and tunnels accommodate its elevated and surface cars and a portion of the cars from the Boston and Northern Company.

The annual expenditures of the city for maintenance and operation amount to about \$40,000,000 (including \$1,700,000 by the county), the main items of expense being about \$4,740,000 for schools, \$3,400,000 for interest on debt, \$2,300,000 for the police, \$4,500,000 for public works, which comprise streets, sewers, water, bridges, ferries, and municipal lighting (consolidated in a single department in 1910), \$1,003,000 for water service, \$1,720,000 for the fire department, \$1,200,000 for charitable institutions, \$450,000 for parks and playgrounds. The assessed valuation of property, real and personal (the basis of assessment being 100 per cent), in 1912 was about \$1,480,000; the funded debt (1913) was, approximately, \$72,500,000, including \$2,370,000 county debt. The legal borrowing limit is fixed at 2½ per cent of the average assessed valuation for three years.

Population. From a very early date Boston has ranked among the largest American cities.

The growth of its population has been gradual and steady, as seen from the following figures: 1790, 18,320; 1800, 24,937; 1850, 136,881; 1870, 250,526; 1890, 448,477; 1900, 560,892; 1910, 670,585; 1914 (est., based on the observed increase from 1900 to 1910), 724,243.

The first sections to be settled in Boston were the harbor front and the north end of the peninsula. Until towards the middle of the nineteenth century the population was still largely confined to the peninsula. After that period the population began to spread out into Charlestown, East Boston, South Boston, and in later years turned to Roxbury, West Roxbury, Dorchester, and Brighton. Boston proper (by which the city exclusive of the annexed parts is designated) contains now less than a third of the total population, business buildings crowding out dwellings. What was the earliest genteel quarter, the North End, has become a part of the commercial section of the city and is largely taken up with the dwellings of immigrant people. Similarly the South End, a fashionable quarter of the mid-nineteenth century, gradually changed its character with the crowding in of business interests, and the "court end" shifted therefrom to the Back Bay section.

While it is claimed for Boston that it still retains its old American spirit and character, the city has a larger foreign element than many other large American cities. The percentage of people of foreign birth in 1890 was 35.27, and those of foreign parentage constituted 60.9; while in 1900 the former constituted 34.8 per cent, and in 1910 35.9 per cent, of the total population. Of the foreign nationalities, the Irish are most strongly represented. The largest immigration of Irish took place in the decade 1845-55, the immigrants settling in the once fashionable section of the North End. The Scotch, English, and Germans are represented in much smaller numbers, while in later years the immigration has been made up largely of Italians and Russian Jews, the latter having taken the place of the Irish in the North End of the city. The colored population is very small, having been less than 12,000 in 1900 and under 14,000 in 1910. The geographical conditions, unlike those of New York, have allowed of an easy expansion of the city limits, thus preventing excessive overcrowding. However, the North and South Ends have a congested population.

History. The peninsula on which old Boston was built was known as Shawmut, or Living Waters, or Near the Neck, to the Indians, and was named Trimontaine by the early Colonists at Charlestown, from the three-peaked top of its highest hill, which became Beacon Hill. It was first visited by an exploring party from Plymouth in 1621. In July, 1630, the Colonists brought by John Winthrop to Salem established themselves at Charlestown; but on the invitation of William Blackstone, or Blaxton, a "bookish recluse," who had lived on the peninsula since 1625, Winthrop and the greater part of his company moved to Trimontaine on or before Sept. 17, 1630, on which date the place was renamed Boston, after the Lincolnshire town whence the chief men of the company had come. The old "Trimontaine," changed to Tremont, is preserved in Tremont Street and in a theatre and other buildings. On Oct. 19, 1630, the first General Court met at Boston "for the establish-

inge of Gov^t," and on Oct 3, 1632, the court adopted the vote. "It is thought by generall consent that Boston is the fittest place for publique business of any place in the Bay," thus establishing it as the capital of the Massachusetts Bay Colony. Early in 1632 the first meetinghouse was erected, near the head of the present State Street, and three years later the first free schoolhouse was built on the present School Street. In 1635 the first grand jury of the country met in Boston. Boston soon became the chief town of the Massachusetts Bay Colony and the centre of Puritan religious life and learning. In 1636 the Antinomian controversy (see HUTCHINSON, ANNE) broke out and, with the disturbances caused by Roger Williams (q.v.), led to the emigration of many prominent citizens. Between 1648 and 1688 four women—Margaret Jones of Charlestown, Mary Parsons of Springfield, Ann Hibbins, and Goody Glover—were executed for witchcraft, and between 1659 and 1661, during the excitement caused by the Quaker immigration, four Quakers were hanged on the Neck for returning after banishment on pain of death. A post office was opened in 1639. In 1652 a mint was established, at which the "pine-tree" shillings were coined for a number of years. In 1686 the first bank, and the first in the Colonies, was chartered. A printing office was opened in 1674, and in 1704 the *Boston News Letter*, the first regular newspaper to be printed in America, began publication. At the beginning of the eighteenth century Boston was the largest and most important town in America, and its citizens took a leading part in the expression of public opinion in the conflict of the Colonies with Great Britain. The impressment of seamen by the home government in 1747 caused several riots, and the spirit of independence increased till the Stamp Act in 1765, and later the revenue acts, incited outbreaks, which led to the quartering of two British regiments in Boston. On March 5, 1770, the "Boston Massacre" (q.v.) occurred. On Dec 16, 1773, occurred the famous Boston "Tea Party" which caused Parliament to pass the Boston Port Bill (q.v.)—in effect June 1, 1774—virtually closing Boston harbor to commerce. At the outbreak of the Revolution Boston was occupied by British troops, but was besieged by the American army after the skirmishes at Lexington and Concord, and attempts to fortify Charlestown were followed by the battle of Bunker Hill (q.v.), June 17, 1775. By fortifying Dorchester Heights Washington forced the British to evacuate the town, March 17, 1776.

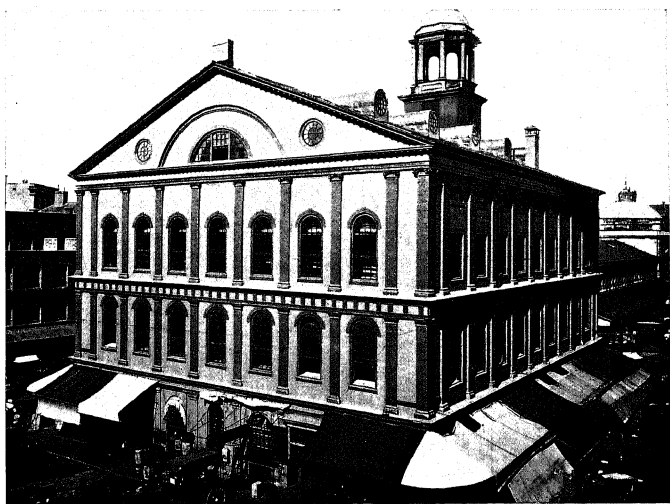
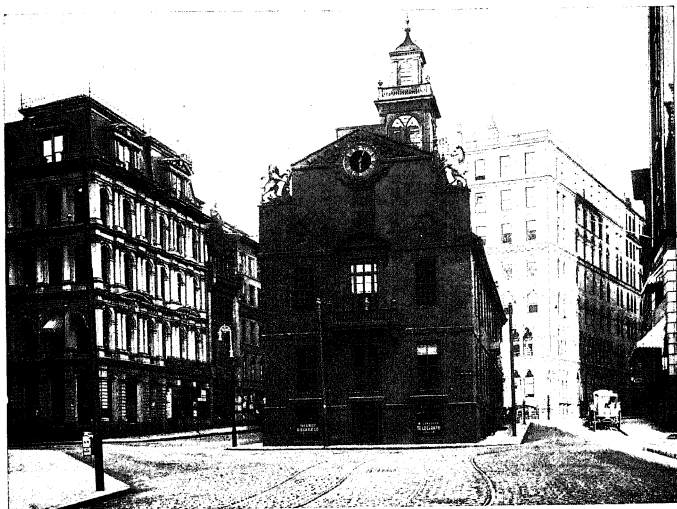
Since the Revolution Boston's prosperity has been almost continuous, the most important interruption having been caused by the Embargo of 1807. The city received its charter in 1822, and had then a population of 47,000. In 1840 the *Brannania*, the first of the Cunard liners, entered Boston harbor and began the present system of transatlantic passenger traffic. In 1849 there was an epidemic of cholera, 5080 dying out of a population of 130,000. Slaves were owned in Boston as early as 1638 and continued to be held till after the Revolution. In 1831 William Lloyd Garrison began the publication of *The Liberator*, and organized (1832) the New England Antislavery Society, the first society to advocate immediate emancipation. Boston thus became the centre of the radical Abolitionist movement, though in 1835 there was an anti-Abolitionist riot. Intense excite-

ment was caused throughout the country by the rescue here of Shadrach, in February, 1851, and the return to slavery from here, under the provisions of the Fugitive Slave Law of 1850, of Thomas M. Sims (q.v.), in April, 1851, and of Anthony Burns (q.v.), in May, 1854. During the Civil War Boston strongly supported the measures of the Federal government and sent more than 26,000 men to join the army and navy. The city has suffered severely from fires, the most destructive occurring in 1676, 1679, 1711, 1760, 1872, 1889, and 1893. That of 1872 was especially disastrous, 60 acres in the business portion of the city having been thoroughly devastated, and property valued at over \$60,000,000 destroyed. On Sept 17, 1880, the two hundred and fiftieth anniversary of the settlement of Boston was celebrated with great enthusiasm.

Consult Justin Winsor's (editor) exhaustive and scholarly *Memorial History of Boston, Including Suffolk County* (4 vols, Boston, 1880-81), also Quincy, *A Municipal History of the Town and City of Boston, from 1630 to 1830* (Boston, 1852), Hale, *Historic Boston and its Neighborhood* (New York, 1898), Drake (Samuel G.), *History and Antiquities of Boston, from 1630 to 1670* (Boston, 1854), Drake (Samuel A.), *Old Landmarks and Historic Personages of Boston* (Boston, 1900), Lodge, "Boston," in the *Historic Towns Series* (London, 1891), Howe, *Boston, the Place and the People* (New York, 1903), Sprague, *Government of Boston, Its Rise and Development* (Boston, 1890), *Directory of the Charitable and Beneficent Organizations of Boston* (Boston, 1899), "The Completion of the Boston Subway and New Arrangements of Street Cars," in *Railroad Gazette*, No 30 (New York, 1898), Benton, *Story of the Old Boston Town House* (Boston, 1908), Howe, *Boston Common Scenes from Four Centuries* (Boston, 1910), Sullivan, *Boston, New and Old* (Boston, 1912).

BOSTON, THOMAS (1677-1732). A Scottish divine and author, born at Dunse (Berwickshire). He was educated at the University of Edinburgh (M.A., 1694), and in 1699 was ordained to the Presbyterian ministry and appointed to the parish of Simprin. In 1701 he was clerk of synod, and in 1707 became pastor of Ettrick (Selkirkshire). It was through his reading and recommendation to friends of the treatise *The Marrow of Modern Divinity*, by Edwin Fisher, that the well-known Marrow controversy (q.v.) was instituted. He wrote *Human Nature in its Fourfold State* (1720), a strongly Calvinistic work, frequently reprinted, and a popular sermon styled *The Crook in the Lot* (1863). Consult his *Memoirs* (1776) and the *Whole Works* (ed by S. McMillan, London, 1854).

BOSTON ART SCHOOL. An institution connected with the Boston Museum of Fine Arts. Shortly after the opening of the Museum in 1876 a few rooms were set apart for technical instruction in drawing, modeling, and painting, and later a department of decorative design was added. In 1909 the school was moved into a building of its own adjoining the new Museum. The number of students, who come from all parts of the United States and even from foreign countries, is limited to about 250. The teaching is of a high order, and the school has trained many artists who have since risen to prominence. Among the scholarships offered the most



BOSTON
THE OLD STATE HOUSE (UPPER)
FANEUIL HALL (LOWER)

important is the Paige Traveling Scholarship, paying \$800 a year. There are also several annual prizes.

BOSTON COLLEGE. An institution for higher education under the auspices of the Roman Catholic church. It was chartered in 1863 and opened in Boston, Mass., in September, 1864. There are 45 founded scholarships. In September, 1913, the collegiate department was removed to Chestnut Hill, Mass., where a new site and a new building had been secured, while the old building in Boston has been devoted to the preparatory school. The value of all the buildings and grounds is somewhat over \$1,000,000; and the income from tuition fees about \$30,000. The faculty for college departments in 1913 numbered 18 and the students 400; the number of instructors in the preparatory school was 30 and the number of students 900. The library contains 50,000 volumes. The college course is four years, leading to the degree of A.B. The president in 1914 was the Rev. Charles W. Lyons, S. J.

BOSTONIANS, THE. A novel by Henry James (1886).

BOSTONITE. A fine-grained igneous rock related in composition to trachyte (q.v.), but containing no basic feldspar and very little or none of the dark silicates. The main ingredient is feldspar of the alkali variety, such as microcline, micropertite, or anorthoclase, so that the rock usually has a very light color. The texture may be even-grained or porphyritic. Bostonites occur in dikes and are rather common, though nowhere extensive as to area. They are found in the New England States—but not in the immediate vicinity of Boston, as might be inferred from their name—in the Champlain valley, the adjoining section of Canada, and in the British Isles.

BOSTON MASSACRE, THE. After the quartering of British troops in Boston (1768), there was continual friction between the soldiery and the people. Several minor riots occurred early in 1770, and the trouble culminated on March 5, when seven soldiers under Captain Preston, who were being pelted with snowballs and stones by fifty or sixty of the populace, headed by one Crispus Attucks (q.v.), fired into the crowd, killing three and wounding seven more, of whom two died. This act infuriated the Boston people, who met in mass meeting and compelled the withdrawal to Castle Island (March 12) of the two regiments of troops. The seven soldiers, with Captain Preston, were tried for murder in October and November, were defended by John Adams and Josiah Quincy, and were finally acquitted, though two of them were declared guilty of manslaughter and received light punishments. There is much difference of opinion with respect to the "Massacre," some writers regarding it as a lawless affair discreditable to the people and the soldiers alike and without any great historical significance; others, as the "first act in the drama of the Revolution." In 1816 John Adams wrote: "Not the Battle of Lexington or Bunker Hill, not the surrender of Burgoyne or Cornwallis, were more important events in American history than the battle of King Street on the 5th of March, 1770." The day was annually commemorated in Boston until 1783, and in 1888 a monument was erected to the memory of the 10 victims. Consult Kidder, *History of the Boston Massacre* (Albany, 1870)

and Winsor, *Memorial History of Boston*, vol. iii (Boston, 1880-81).

BOSTON PORT BILL. A bill passed by the British Parliament, and signed by the King in March, 1774, to punish the people of Boston for their destruction of tea in Boston harbor, Dec. 16, 1773. (See BOSTON.) It was to go into effect on June 1 and provided for the virtual closure of Boston harbor to commerce, for the removal of the seat of government to Salem, and for the supplanting of Boston by Marblehead as a port of entry, until the people of Boston should indemnify the owners of the property destroyed and fulfill other specified conditions. This, the greatest encroachment yet made by Parliament upon the liberties of the Colonists, aroused an instant and widespread feeling of indignation and alarm. Assurances of sympathy and support were immediately sent to the people of Boston by the legislatures and committees of correspondence of other Colonies, and June 1 was widely observed as a day of fasting and prayer, bells being tolled, flags placed at half-mast, and houses draped in mourning. Material aid was also given from all quarters, food supplies being sent from as far as South Carolina. Nonimportation agreements were everywhere urged, pamphlets and broadsides were issued, and finally a general congress—the first Continental Congress—was called to discuss this and other obnoxious acts passed in the same year and to devise measures for relief. Consult: Frothingham, *Rise of the Republic* (Boston, 1872); Pickering, *Statutes at Large*, vol. xxx (London, 1842); Halsey, *Boston Port Bill* (New York, 1904).

BOSTON SYMPHONY ORCHESTRA. One of the finest orchestras in the United States. Ever since the beginning of the nineteenth century the works of the great instrumental masters had been performed by amateur orchestras. In 1881 Mr. Henry L. Higginson established a permanent orchestra, which was to give a series of 24 subscription concerts on Saturday nights throughout the season. Each concert is preceded by a public rehearsal on Friday afternoon. Originally the orchestra consisted of 67 pieces. The first conductor was Georg Henschel. He was succeeded by Wilhelm Gericke, who soon made his orchestra the equal of any body of performers in Europe. Arthur Nikisch kept the orchestra at its high degree of technical excellence and infused his interesting personality into interpretation of the works of the great classical masters. His successor, Emil Paur, was a conductor of wonderful temperament, with strong leaning towards the Neo-German school, whose works figured extensively on his programmes. He, in turn, was again succeeded by Wilhelm Gericke, who at the end of his five years' contract retired in 1906, and was succeeded by Dr. Karl Muck. From 1907 to 1912 Max Fiedler was the conductor. During his incumbency the orchestra was increased to 96 performers, and the number of concerts given in various cities averaged 100 per season. He also introduced the custom of giving concerts without soloists. In 1912 Dr. Muck returned as conductor. After 1890 the Boston Symphony Orchestra regularly visited New York, where they gave five concerts on Thursday nights. A new feature was the establishment, in 1900, of afternoon concerts on Wednesdays in New York. These were not public rehearsals, inasmuch as different programmes

with different soloists were performed on Wednesdays and Thursdays. In 1904 these Wednesday concerts were changed to Saturday Rehearsals are held daily during the season. This, and the fact that the members play only at concert performances, are the principal reasons for the high perfection that marks the playing of this orchestra. The conductor is now always appointed for five years. Franz Kneisel, the former concert master, organized from among the members of this orchestra his famous quartet, which is not surpassed by any kindred organization in the world. In 1904 Kneisel was succeeded by Prof. Willy Hess, who organized the new Boston Symphony Quartet, and he, in 1906, by Karl Witek. In 1905 Colonel Higginson invited Vincent d'Indy to conduct the orchestra in a few concerts presenting works of the modern French school. The twenty-fifth anniversary of the founding of the orchestra was celebrated by a special Wagner concert towards establishing a pension fund. The success of this concert was such that a Wagner concert is given annually for this purpose.

BOSTON TEA PARTY, THE A popular designation of the summary action of a party of Bostonians, on Dec. 16, 1773. After an unavailing protest against the importation of tea as part of the policy of taxing the Colonies without representation in Parliament, a number of citizens, in Indian disguise, proceeded to three ships carrying cargoes of tea and threw about 350 chests of tea into the harbor. In retaliation for this action the port was declared closed.

BOSTON UNIVERSITY. A system of allied schools and colleges. The university is situated in Boston, Mass., and was chartered by the Massachusetts Legislature in 1869, the original incorporators being Isaac Rich, Lee Claflin, and Jacob Sleeper. The university is divided educationally into (1) a College of Liberal Arts (1873), (2) a School of Theology (1871), a School of Law (1872), a School of Medicine (1873), a College of Business Administration (1913), and (3) a general post-graduate department, known as the School of Arts and Sciences. The administration of the university is vested in a university council, consisting of the president of the university and the deans of the constituent schools, a university senate, consisting of the council and the professors of the several faculties, and a corporation, composed of trustees, not less than 10 in number nor more than 50, elected for a term of five years each. The chief benefactor of the university was Isaac Rich, in whose honor the institution founded 64 free scholarships, since then the university has founded over 200 other scholarships as well as two fellowships. The property held by the institution is valued at \$2,500,000. The number of instructors in 1913 was 141, and the number of students 1508. President, Lemuel H. Munlin, LL.D.

BOS/TRA See **BOZRAH**

BOSTROM, bös'trēm, CHRISTOFFER JACOB (1797-1866). A Swedish philosopher. He was born at Pitea and studied at the University at Upsala. In 1838 he was appointed an adjunct professor of philosophy at the university and from 1840 to 1863 held the chair of practical philosophy. He wrote little, but his system has been very influential in Sweden, where it is still the most prominent in centres of

higher education. He has been termed by Falckenberg (*History of Modern Philosophy*, Armstrong's trans.) "the most important systematic thinker of his country." His teaching, defined by himself as "rational idealism," presents reality as spiritual only, and God as an absolute, self-conscious unity, in which all living beings, according to degree, are forever immutably contained. Each living being is a thought of God, and as such potentially emancipated from space and time. Yet man belongs also to a sensible world, which exists for him until he rises beyond the limited to the real and becomes for himself that which he is in God. Bostromian ethics, recalling that of Krause, makes society, as well as the individual, a thought of God, holds constitutional monarchy to be the sole reasonable form of state and regards an all-comprehensive system of states as the ultimate ideal of political development. Bostrom's writings have been edited by Edfelt (Upsala, 1883). Consult Hoffding, "Die Philosophie in Schweden," in the *Philosophische Monatshefte*, vol. xv (Berlin, 1879).

BOSTWICK, ARTHUR ELMORE (1860-) An American librarian and author, born in Litchfield, Conn. He graduated from Yale in 1881, and two years later received the degree of Ph.D. After a short period of teaching he went into literary work, first on Appleton's *Cyclopaedia of American Biography* and Appleton's *Annual Cyclopaedia*, then on the *Standard Dictionary*. In 1895 he became chief librarian of the New York Free Circulating Library, in 1899 of the Brooklyn Public Library, in 1901 of the circulation department of the reorganized New York Public Library, and in 1909 (when he became president of the American Library Institute) of the St. Louis Public Library. He was interested in university extension work. With J. D. Champlin he edited an excellent *Young Folks' Cyclopaedia of Games and Sports* (1890). He wrote *The American Public Library* (1910), a standard work, *The Different West, as Seen by a Transplanted Easterner* (1913), and *Earmarks of Literature* (1914).

BOSWELL, bōz'wēl, JAMES (1740-95). A Scottish lawyer and writer celebrated as the biographer of Dr. Samuel Johnson. He was born Oct. 29, 1740, in Edinburgh, where his father, who had the title of Lord Auchinleck, from the name of his property in Ayrshire, was one of the judges of the Court of Session. He was intended by his father for the law. He studied first in Edinburgh and Glasgow and afterward at the University of Utrecht, where he went in 1763. When in London in that year, May 16, he made the acquaintance of Johnson, an event of decisive importance for his whole subsequent life. The acquaintance was earnestly sought by himself and originated in his ardent admiration of Johnson's writings. He spent one winter in Utrecht, and then proceeded on a tour through Germany, Switzerland, and Italy, and visited Corsica with a letter of introduction from Rousseau to Paoli, with whom he contracted a warm and lasting friendship. He enthusiastically adopted the cause of Corsican independence and after his return to Scotland published his *Account of Corsica* (1768), which was speedily translated into several languages. Boswell became a member of the Faculty of Advocates in 1766, but never devoted himself with earnestness to the law. In 1773 he was admitted into the Literary Club, instituted by

Johnson, of which Burke, Goldsmith, Reynolds, and Garrick were members. From this time he made it his principal business to note down his sayings and doings of Johnson, with whom he associated on most intimate terms, and whom he accompanied on his tour to Scotland and the Hebrides in 1773. It has been estimated that, taken all together, Boswell met Johnson on 276 days. Boswell was married in 1769 to his cousin, Margaret Montgomerie, by whom he had several children. After Johnson's death, in 1784, he employed himself in arranging the materials which he had collected for his long-contemplated biography. His *Journal of a Tour to the Hebrides* appeared in 1785; his *Life of Samuel Johnson*, 2 vols., in 1791. Both have gone through many editions. Boswell has been emphatically styled by Macaulay "the first of biographers." His work is indeed full of details, and these are such as exhibit character and are arranged in the most interesting manner. He conceals neither his own faults nor those of Johnson, but presents a picture of which the truthfulness is too vivid to be questioned: and Johnson is, unquestionably, better known by the pages of Boswell than by any of his own writings. Boswell died in London, May 19, 1795. Besides the works already mentioned, he was the author of several productions of great interest to the curious. In 1857 appeared a posthumous volume of *Letters of James Boswell, addressed to the Rev. W. J. Temple, from the Original MSS.*, in which the gay, insouciant character of the man very strongly appears. The sketches of Boswell by Macaulay and Carlyle are famous. Consult Rogers, *Boswelliana* (London, 1874), and Fitzgerald, *Life* (London, 1891). For the best edition of *The Life of Johnson*, consult Hill (Oxford, 1887), in 6 vols., with the standard edition of the text and minutely curious annotations; Bissell, *Boswell as a Biographer* (New York, 1905); and Brown, *The Youth and Early Manhood of James Boswell* (Glasgow, 1910).

BOSWELLIA, bôz-wel'li-a (named after Dr. John Boswell). A genus of trees of the family Burseraceae. About 15 species are known, natives of tropical Africa and the East India region. The most interesting species is *Boswellia serrata*, the tree which yields olibanum (q.v.), now very generally believed to have been the frankincense (q.v.) of the ancients. It is a large timber tree, with pinnate leaves, which have about 10 pairs of hairy serrated oblong leaflets, and an odd one, each leaflet about 1 to 1½ inches in length. The flowers are small and numerous, in axillary racemes, and of a pale-pink color. When the bark is wounded, the olibanum, of a delightful fragrance, flows out and hardens by exposure to the atmosphere. The tree is found in the mountainous parts of Coromandel and is supposed to be also a native of other parts of India, and of Persia, Arabia, and perhaps Abyssinia. A very similar species, a native of India, also yields a resin, comparatively coarse, which is used as a substitute for pitch. *Boswellia papyrifera* is indigenous in parts of Africa, extensive forests of this species being reported in the mountains of Morocco. *Boswellia carterii* is also common in Africa and yields large quantities of olibanum.

BOSWORTH, bôz-wôrth, or MARKET BOSWORTH (AS. *Bosan*, Bosa's + *worthe*, farm). A small market town of Leicestershire, England, famous for the moor, 2 miles to the south, where

the battle of Bosworth Field was fought (Aug. 22, 1485). In this battle, which terminated the Wars of the Roses, Richard III was slain, and on a near elevation called Crownhill Lord Stanley placed the crown on the head of the Earl of Richmond as Henry VII.

BOSWORTH, FRANCIS HUNTINGTON (1843-). An American physician, born at Marietta, Ohio. He studied at Yale and at the Bellevue Hospital Medical College, where, in 1898, he became professor of diseases of the throat. He was also appointed consulting physician to the Presbyterian and St. Vincent's hospitals, New York. He retired in 1906. His publications include a *Treatise on Diseases of the Nose and Throat* (2 vols., 1893); *Text-Book of Diseases of the Nose and Throat* (1896); *The Doctor in Old New York* (1898).

BOSWORTH, JOSEPH (1780-1876). An English philologist. He was born in Derbyshire. He graduated at Aberdeen and also took degrees from Oxford and Cambridge. In 1817 he obtained the vicarage of Horwood Parva, Buckinghamshire. He devoted such time as an active discharge of his parochial duties left at his disposal to literature and especially to researches in Anglo-Saxon. The result of his labors appeared in 1823 in *Elements of Anglo-Saxon Grammar*, republished in 1826 with additional material under the title *Compendious Grammar of the Anglo-Saxon Language*. In 1838 he published the work by which his name is best known, *A Dictionary of the Anglo-Saxon Language* (new ed., very much enlarged and improved by T. N. Toller, 1882-98; *Supplement*, Oxford, 1908). Bosworth lived in Holland from 1829 to 1840 as British chaplain, first at Amsterdam and later at Rotterdam, and during this period he translated the Book of Common Prayer into Dutch. On his return to England he was presented to the vicarage of Waith in Lincolnshire. In 1857 he became rector of Water Shelford in Buckinghamshire, and in the following year Rawlinson professor of Anglo-Saxon at Oxford. In 1865 he published the Gospels in Gothic of 360 and in Anglo-Saxon of 995 in parallel columns with Wycliff's version of 1389 and Tyndale's of 1526. In 1867 he founded a professorship of Anglo-Saxon at the University of Cambridge. He died May 27, 1876.

BÖSZÖRMÉNY, bö'ser-mä-y' (cf. Russ. *basurman*, Mussulman, Hung. *hajdu*, Turk. *haiduk*, a light-armed Turkish or Hungarian guard), HAJDÚ-BÖSZÖRMÉNY. A town of the Kingdom of Hungary, about 8 miles north-northwest of Debreczin (Map: Hungary, G 3). It is situated in the midst of a fertile district, growing vegetables and fruit, particularly melons, in large quantities. Pop., 1900, 25,065.—BÉREK-BÖSZÖRMÉNY, a town in the county of Bihar, 18 miles northwest of Grosswardein, had in 1900 a population of 3340.

BOT, or **BOTFLY** (cf. Gael. *bottus*, belly worm). Names common to several dipterous insects of the family *Cestridae*, which are parasitic in their early stages upon or within certain domestic and wild animals.

The HORSE BOT, or botfly of the horse (*Gastrophilus equi*), is a creature well known to stockmen and veterinary surgeons. The adult fly is about three-quarters of an inch in length; the body is very hairy and brown in color. The female has an extensible abdomen. She poises herself in flight near a horse, then darts suddenly towards the animal, gluing an egg to a

hair almost instantly, then retreating for a yard or two until another egg is ready to be deposited. In this way hundreds of eggs may be deposited upon a horse in a short time. The larvæ, or maggots, soon form within the eggs, but these do not hatch unless the horse licks itself, in which case the eggs are carried to the alimentary canal, hatch almost immediately, and the larvæ enter the stomach, where they attach themselves to its wall and remain until fully grown. The inner stomach wall of a horse is frequently covered with large patches of these larvæ densely crowded together. This attachment to the walls of the stomach probably causes an irritation which interferes with the normal action of the glands, or reduces the glandular surface, the grubs also probably extract some nutriment from the walls of the stomach. There can be little doubt that the presence of these grubs is injurious to the horse, although some stock raisers consider this injury insignificant. When fully grown, the larvæ loose their hold and pass through the pyloric orifice of the stomach and down through the intestines, occasionally attaching themselves to the intestinal wall or to the wall of the rectum, causing irritation which is sometimes severe. They are finally voided with the excrement, transformed to pupæ near the surface of the ground, and eventually the adult flies appear. There seems to be but one generation annually. Horses kept in stables are little troubled if they are well groomed. In pastures or on ranges, however, unless the stock is washed every two or three weeks, bots are apt to be present. Turpentine, used with care, is considered a remedy for those which succeed in establishing themselves in the stomach.

The Ox Bot, ox warble, ox worm, or heel fly, as it is termed in the West (sometimes simply "the grub"), belongs to a different genus of *Cestridae* and has quite different habits. The American species is *Hypoderma lineata*, Villers, and the European species is *Hypoderma bovis*, L. The "grubs" of this species are found in lumps or pockets in the skin of cattle, and it was formerly supposed that the fly laid its eggs upon the hairs and that the larvæ worked their way through the skin, forming cysts in which they remained through the entire larval life, but it has recently been discovered that the life of the species is more complicated. The flies appear early in the spring and attach their eggs to the hairs, particularly of the legs, of cattle, and especially the part just above the hoof, whence comes the name "heel fly." The eggs, or the quickly hatching larvæ, are carried into the mouth of the animal when it licks its legs, and the larvæ penetrates the walls of the oesophagus by means of its strong spines. After penetrating the oesophagus it casts its skin and becomes nearly smooth, and for several months works through the connective tissue between the skin and the flesh, penetrating gradually down the neck and ultimately reaching a point beneath the skin in the region of the back. In the meantime all traces of inflammation have disappeared from the oesophagus. When the final position is reached, the grub molts again, becomes more spiny, and bores a hole through the skin through which it gets air for breathing. Its presence causes much irritation, and it feeds upon the pus and bloody serum which collect. Several individuals usually join together in one of these punctures or sores. When fully

grown, it forces its way through the skin, drops to the ground, where it transforms to a pupa, and the following spring the adult fly emerges. The adult looks much like the common honey-bee. It is about half an inch long, black in color, and is clothed with reddish-brown hairs. An oily application to the wound will kill the grubs, and some simple antiseptic, like carbolic acid, causes a rapid healing. When the insects are common, however, cattle become emaciated and their skins are spoiled for commercial purposes by the perforations. The money loss in the United States through the work of this insect is very great.

The SHEEP Bot (*Oestrus ovis*, L.) belongs to still another genus of *Cestridae* and differs again radically in habits. The adult flies are smaller than those of the other species mentioned and resemble large house flies. The color of the head and thorax is dull yellow, but so spotted with brown as to appear brownish. The abdomen is velvety and variegated with dark brown and straw color. The female fly lays her eggs in the noses of sheep. They hatch almost immediately, and the larvæ at once commence to work their way up the nostrils and the nasal passages, causing great irritation, until they reach the frontal sinuses, which are cavities located between the two plates of the skull, and lying one on each side of the central line of the head and between and a little above the eyes. Here they attach themselves to the membranes which line the sinuses, and feed upon the mucus. The damage caused by this insect has probably been underestimated. Stiles has found that in Colorado, in some large flocks, at least 25 per cent of the animals are affected, and after conducting a number of post-mortems he is convinced that in many cases the bots cause the death of the animal. It is the custom in some places to prepare "salt logs" for the sheep to visit. The salt is placed in cavities in the log, and the edges of the cavity are smeared with tar, so that the sheep in eating the salt gets a certain amount of tar upon its nose. This is supposed to deter the flies from laying their eggs. A recent remedy proposed by Stiles consists in puncturing the frontal sinuses with a trochar and syringing in a small quantity of gasolene.

Other bot flies affect domestic animals and in tropical regions even man himself. The *Oestrus hominus* of Linnaeus and the *Dermatobia noxalis* of Goudot, in Guana, Mexico, and other tropical regions, lay their eggs upon the skin of monkeys and of human beings, and the larvæ form cysts under the skin, much like those of the ox bot. The emaculating bot fly (*Cuterebra emasculator*, Fitch) lives in the larval state in the inguinal and axillary regions (testicles) of squirrels and gophers. The rabbit bot fly (*Cuterebra cuniculi*, Clark) in the larval stage forms a large tumor in the skin of the common rabbit. Other species affect reindeer in Europe, and deer, elk, and antelopes in America. The history of many American species, with illustrations, may be found in Osborn's *Insects Affecting Domestic Animals* (Bulletin No 5, N. S., Div of Entomology, U. S. Dept. Agri., Washington, 1896), which also contains an extensive bibliography of the *Cestridae*.

BOTANIC GARDEN (Gk *botanikos*, *botanikos*, pertaining to herbs, plants, see BOTANY). An area upon which is grown a collection of plants primarily for scientific purposes. In

such a collection the idea may be to include as many forms of vegetation as can grow in the conditions of the garden; it may be to illustrate some special phase of botany, as natural relationships, ecology, economic botany, etc.; or it may be to furnish material for instruction and research. The Benedictine monks of Italy are said to have established the first botanic gardens in the ninth century, but they were designed entirely for growing the various medicinal plants. It was not until the latter part of the sixteenth century that plants began to be collected into gardens for scientific purposes. Since that time the botanical garden has been a growing factor in connection with research work, until now a college or university does not seem properly equipped without the facilities of such a garden.

The "Jardin des Plantes" of Paris, established in 1633, probably contains the largest collection of living plants, the catalogue enumerating 15,000 species. One of the most famous gardens is the Royal Garden at Kew, near London, which has its branches in every English colony. It lays stress primarily upon the economic value of plants, the stations in the numerous colonies being almost entirely engaged in testing the economic qualities of plants. In addition to serving this purpose, the garden is a great pleasure park; and its herbarium and library make it one of the great centres of work in systematic botany. The botanic garden which is most favorably situated and best equipped for scientific research is that of Buitenzorg, Java, established by the government of Holland in 1817. Its original purpose was to test the economic value of plants for the East Indian colonies, but its contact with tropical vegetation and the scientific spirit of its management have made it a great centre of research. Notable and very old European gardens are those of Bologna, Leyden, Montpellier, Giessen, Strassburg, Jena, and Upsala. In Germany the botanic garden is an essential adjunct of the botanical institutes, and in such conditions the most notable advances in botanical knowledge have been made. Conspicuous among those gardens, with their botanical institutes, which are prominently identified with botanical progress, are those of Munich, Wurzburg, Tübingen, Göttingen, and Leipzig.

In the United States a few botanic gardens are in the process of development, but their importance has never been appreciated by those who are able to establish them. That they are necessary adjuncts to any university which professes to do research work is an idea which has never taken any hold upon boards of management. The few gardens which have been started in the United States, and which bid fair to get beyond the initial stage of elementary instruction, are as follows: the Missouri Botanical Garden (the old "Shaw Gardens") at St. Louis, in connection with Washington University; the Botanical Garden at Cambridge, in connection with Harvard University, where, upon an area of seven acres, there are about 5000 growing plants; the Arnold Arboretum at Jamaica Plain, a public park of Boston, also in connection with Harvard University, and devoted entirely to hardy trees and shrubs; and the New York Botanical Garden, the most recent and one of the most promising garden establishments, occupying an area of 250 acres in Bronx Park, New York City.

BOTANIC SOCIETY, ROYAL. This society, incorporated in London in 1839, organized the Botanical Gardens in London, and has established a school of practical gardening, which annually distributes thousands of cut specimens among the various schools and colleges. The society holds exhibitions in the spring and fall. The Duke of Teck is president, and the library and office are at Inner Circle, Regent's Park, N. W. The society has issued a *Quarterly Record* since 1880. For other English botanical societies, see **HORTICULTURAL SOCIETIES**.

BOTANICAL GEOGRAPHY. See **DISTRIBUTION OF PLANTS**.

BOTANICAL SOCIETY OF AMERICA. A national scientific association organized in 1893 as an outgrowth of the Botanical Club of the American Association for the Advancement of Science. The membership includes many of the best-known botanists of the country.

BOT'ANY (Gk. *botanē*, *botania*, or *botany*, *botanē*, grass, plant). The science which treats of plants. Botany has become a very diversified subject, in fact, a group of sciences. The common bond is that plants furnish the material for study, but the methods of study are numerous. The scientific study of plants began in connection with their use in medicine, so that the earliest botanists were physicians. Gradually the subject differentiated, until now there are many divisions of botany. The principal divisions of the subject are defined in the following account.

Taxonomy. The classification of plants preceded all other aspects of botany by many centuries. The earliest records of plant descriptions are found in the writings of Hippocrates (460-357 B.C.), who has been called "the father of medicine." Notable later authors of the ancient period were Aristotle (384-322 B.C.), Dioscorides (first or second century of the Christian Era), and Pliny (23-79 A.D.). It was in the sixteenth century that the history of taxonomy really begins, with the publication of "herbals." These works are simply descriptive lists of wild and cultivated plants, often accompanied by rough woodcuts. The first herbal of importance is that of Brunfels (1488-1554); followed notably by those of Bock (1498-1554), in which the plants were grouped as herbs, shrubs, and trees; of Fuchs (1501-1566), in which botanical terminology began; and of Dodoens (1517-1585). Gradually the idea of natural affinities developed, which probably reached its first decided expression in the *Icones Stirpium* (1591) of De l'Obel (Lobelius). The first real attempt at classification was made by the Italian Cesalpino (1519-1603) in his *De plantis libris*. The idea of classification was further developed by Bauhin (1560-1642) and Robert Morison (1620-83), who is to be regarded as the first great British botanist.

In the opening of the eighteenth century the notable botanical figure was that of Tournefort (1656-1708), who in his *Institutiones* (1709) established genera and hence is called "the founder of genera." The most distinguished botanist of the eighteenth century, however, was Linnaeus (1707-78), who brought to a climax all the work of his predecessors and put the study of classification upon its modern basis. His notable contribution was the establishment of "binomial nomenclature," according to which every kind of plant bears two names, that of the genus and that of the species. While realiz-

ing that a natural system of classification was inevitable, he felt that not enough knowledge of affinities had been acquired to justify the attempt in his time. In lieu of this, he devised the most elaborate and satisfactory artificial system of classification that had been proposed, a system that remained in use for at least a century.

Following the establishment of genera by Tournefort, and of binomial nomenclature by Linnaeus, the study of taxonomy developed in outline as follows: Antoine de Jussieu (1748-1836) published the first attempt at a natural system of classification, and in so doing grouped genera into families. A. P. de Candolle (1778-1841) grouped families into orders, and the De Candollean sequence of families was in use in all manuals until very recently. Robert Brown (1773-1858) was one of the greatest of English botanists and made most important contributions to a natural classification of plants. Further progress was made by John Lindley (1799-1865), Endlicher (1805-49), Alexander Braun (1805-77), Eichler (1839-87), Bentham and Hooker (1802-83), and A. Engler (1892-).

Engler's classification, most in use among botanists at present, though doubtless to be modified very soon, is as follows: The plant kingdom is divided into four great fundamental groups: (1) Thallophytes (Alga and Fungi), (2) Bryophytes (Liverworts and Mosses), (3) Pteridophytes (Ferns, Horsetails, and Club Mosses), and (4) Spermatophytes (Gymnosperms and Angiosperms). The Thallophytes, as at present constituted, doubtless represent several groups coordinate with the other great groups and probably the gymnosperms and angiosperms are each to be regarded as worthy of first rank. In any event, the general categories have become fairly well established. The subordinate classification of angiosperms is of most general interest, as the group comprises the most conspicuous and best-known forms, the true flowering plants. The two great subdivisions are Monocotyledons (grasses, palms, lilies, orchids, etc.) and Dicotyledons (the ordinary trees, buttercups, roses, peas, heaths, mints, sunflowers, etc.). The overwhelmingly large assemblage is the Dicotyledons, which are now grouped under two heads: (1) Archichlamydeae, with calyx or corolla lacking or of distinct parts, and (2) Sympetalae, with corolla present and its petals more or less united.

All subordinate classification is constantly shifting, in order that it may keep step with the very rapidly accumulating body of morphological data, for Taxonomy must include the last expression of our knowledge of plants.

Morphology While from the historic standpoint taxonomy (classification) deserves first mention, probably the most fundamental subdivision of botany is Morphology, which treats of the structures of plants and their development, and upon whose data taxonomy must build. There was an older morphology which dealt merely with the forms of mature plants and their organs, and whose conception of organs was that everything about a plant could be referred to a very few categories, the favorite ones being root, stem, and leaf. Under this belief every structure which was not evidently root, stem, or leaf was disguised, and the business of morphology was to strip off these disguises and reveal the real nature of the struc-

ture. This phase of morphology was dominated by Goethe's doctrine of metamorphosis—a doctrine which has been a serious impediment to botanical progress.

The present morphology, however, concerns itself more with the development of structures than with the mature forms, a point of view which dates at least from Hofmeister's classic researches of 1851. It is essentially an embryological subject, therefore, whose purpose is to discover from developing structures every possible suggestion as to the relationships and origin of great groups. In such study the life history of a plant is traced from the single cell with which it starts to its mature form, and this life history at more than one point may give suggestions of relationships. To develop a plant through all of its individual history, or to obtain all the stages in the history of some kind of plant, is a long and difficult piece of work. When this is done for the hundreds of thousands of species of plants recorded, morphology will be in a position to supply the data for a real and relatively permanent classification.

At the present stage of morphological progress, however, large problems, such as the origin of the great groups, still confront us. In a general way morphologists may be said to agree to the following statement: The algae represent the most primitive known forms from which the higher plants may be said to have been derived. The fungi are largely regarded as degenerate algae, which have made a certain amount of progress, but have developed no higher groups. The algae, therefore, represent the great ancestral group, and directly from them the liverworts seem to have arisen. The liverworts have certainly given rise to the mosses, and many claim that they have also given rise to the ferns. It certainly seems true that the ferns have come either through the liverworts or directly from the algae. Whatever may be the origin of the ferns, they have undoubtedly given rise to the seed plants (flowering plants). The study of fossil plants has assured us that the fern plants very early gave rise to Gymnosperms (pines and their allies). Whether the Angiosperms (true flowering plants) arose from the Gymnosperms or directly from fern plants is a matter of conjecture, but the former alternative is generally accepted. For a fuller statement of the modern development of morphology, see ALTERNATION OF GENERATIONS, HETEROSPORY.

Anatomy It was early observed that the bodies of the more complex plants consisted of layers of different constitution, but the real nature of the various structures was not determined until the great improvements were made in the microscope in the latter half of the seventeenth century. The first observers of the anatomy of plants (qv) with the microscope were Robert Hooke, Malpighi, Grew, and Leeuwenhoek, and their descriptions of the constitution of plant bodies remained authoritative for over 100 years. Although the discovery was made that plant bodies are made up of cells of various forms, the real study of cells and their development dates from 1840, following the researches of Schleiden and Nägeli. From that time the science of Plant Anatomy (Phytotomy, Plant Histology) has developed enormously, until now the recognized plant tissues are very numerous, and their origin and relation to one another in position and function are fairly well understood. Anatomy is associated on the

one hand with morphology, since the tissues enter into the structure of organs; and on the other hand with physiology, since the nature of the tissues has to do directly with the various functions of the plant.

Cytology. In recent years another definite field of botanical research has been developed, which deals exclusively with the problems of the cell, and is called "Cytology" (q.v.). It is related to anatomy in that it deals with cells, which in their aggregation form the tissues that are the subject of anatomy. At the same time it studies cells from the standpoint of morphology, since it is concerned with cell organs, their origin and mutual relationships; while it also has its distinct association with physiology, inasmuch as the functions of its organs furnish the ultimate problem of the cell. It is through cytological investigation that the technique of research with the microscope has been developed so greatly. The discoveries in methods of killing material, imbedding, sectioning, and staining, have brought to view structures which were invisible to the observers of a few years ago. The principal problems of cytology at present are the structure and activities of protoplasm, the life history of plastids (protoplasmic organs of the cell, of which chloroplasts, the green color bodies of leaves, are examples), the structure and function of the nucleus (an essential and permanent organ of the living cell), the reduction of chromosomes (bodies which enter into the structure of the nucleus), the origin and development of the achromatic figure (a peculiar spindle-shaped body which appears in connection with a dividing nucleus), the centrosome (a cell organ supposed to be prominently concerned in the division of the nucleus), the cell wall, the development of the sex cells, fertilization, the embryo, and the problem of heredity.

Physiology. Nothing was known of the life of plants in the early part of the seventeenth century except what had been learned through agricultural and horticultural operations. It was in the latter half of the seventeenth century that the science of Plant Physiology was founded, long after the physiological significance of the different organs of the human body and of most animals was generally known. The history of the gradual discovery of the various functions of plant organs is long and full of interest. The foundation of all physiology is the direct observation of vital phenomena, and these must be evoked or altered by experiment. It is by means of this experimentation that a definite knowledge of physiological processes has developed, until now the student of plant physiology is in possession of a vast body of facts. Vital phenomena in plants are essentially the same as in animals, but are often simpler; and hence plants frequently furnish the clues for the interpretation of the more complex activities of animals.

The important general functions of plants, which furnish the subject-matter for physiological research, are as follows: Absorption of material and of energy from the outside world; transfer of water through the plant body, by which materials are properly distributed; transpiration, by means of which water is lost from the plant's surface; nutrition, including photosynthesis (the manufacture of carbohydrates), digestion (the conversion of foods into soluble form for transfer), and assimilation (the organ-

ization of protoplasm from food material); secretion; respiration, by means of which energy is liberated for the activities of the body; growth; and movement, which includes irritable responses to many stimuli.

For example, in the higher plants the root is an absorbing organ for water and soluble soil substances; in the root, stem, and leaves there are certain sets of vessels along which water and food materials travel readily; the leaves and the young stem surface are organs for the absorption and evolution of the carbon dioxide and oxygen, they also give off water by evaporation (transpiration), and are most important organs for the manufacture of carbohydrate foods. Although these various processes are distributed among the organs of a complex plant, they may all go on in a single cell of the simplest plant.

Ecology. A phase of plant physiology which has recently come into prominence as an independent subject is Ecology (q.v.) or Ecology, which deals with the mutual relations between plants and their environment. Certain phases of ecology, such as pollination, seed dispersal, protection, symbiosis, have long been studied, and have been called "plant biology." Ecology as at present organized was first presented by Professor Warming, of Copenhagen, in 1895, and a fuller later statement was that of Professor Schimper, in 1898. Three rather distinct lines of ecological investigation have been developed. One deals with the reactions of plants, tissues, and organs to their environment, and may be called physiologic ecology. A second line has to do with the origin, development, and life relations of the plant communities known as plant societies, and may be called physiographic ecology. The third line is a study of the great forest, grass, desert, and other formations of the globe in relation to climate, and may be called geographic ecology.

Various special subjects connected with plants are also organized into distinct fields of work. *Paleobotany* (q.v.) is a study of fossil plants, a subject which has been developing with remarkable rapidity. *Bacteriology* is the science which treats of that very peculiar group of plants known as bacteria, whose relationships to the interests of man are often of great importance, and whose life processes are so peculiar that this study demands special manipulation. *Pathology* is that division of the subject which deals with plant diseases, chiefly those inflicted by other plants. *Economic botany*, closely allied to agriculture and horticulture, is a growing subject, which deals with plants from the standpoint of their usefulness to man. *Forestry* is a special division of economic botany which studies the proper handling of forests. The subject of *Plant breeding* has developed very rapidly since 1900. In its scientific aspect (Genetics) it deals with heredity, while in its practical aspect it is revolutionizing the cultivation of plants.

Below are given only some of the more important works of a general nature on botany. Under the articles ANATOMY OF PLANTS, DISTRIBUTION OF PLANTS, ECOLOGY, MORPHOLOGY, PHYSIOLOGY, PLANT BREEDING, and TAXONOMY a selected list of elementary and advanced books treating those subjects is given. Also, in connection with the treatment of the larger groups of plants, the most important available literature is cited.

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BOTANY, FOSSIL See PALEOBOTANY.

BOTANY BAY An indentation on the eastern coast of Australia, in 34° S lat., about 9 miles south of Sydney, the capital of New South Wales. It was entered by Captain Cook on the 28th of April, 1770. Here Cook took possession of New South Wales in the name of the British King. The north and south heads are named, respectively, Cape Banks and Cape Solander, after the botanists who accompanied the expedition. The inner south head is named Point Sutherland, after a seaman. In 1787 Captain Arthur Phillip was sent out by the British government to found a penal settlement on the shores of this inlet. Phillip deemed the place unsuited to settlement and founded his colony on the present site of Sydney. The bay, which owes its name to Dr Hawkesworth, the editor of Cook's *Voyages*, is a shallow sheet of water some 20 miles in extent. The district has been formed into two municipalities, Botany and Botany North, with a combined population of about 7200 inhabitants (Map New South Wales, F 4).

BOTANY BAY KINO, ke'nó See EUCALYPTUS.

BOTERO, bô-tê'rô, GIUSEPPE (1815-85) An Italian poet. He was born in Novara, studied at the University of Turin, fought in the campaign of 1848, was appointed professor of Ital-

ian literature in the College of Cortemilia in 1849, and was subsequently director of various lycees. His published works include *Ricciarda* (1854), *Raffaele* (1858), *Il Galeotto* (1859), *Didimo Frate* (1865), *Speranza* (1870), *Amore e natura* (1873).

BOTETOURT, bôt'e-tûrt, NORDBORNE BERKELEY, BARON (c1717-70) A Colonial Governor of Virginia, appointed in 1768. Though he dissolved the Colonial Legislature in 1769 for passing resolutions condemnatory of several recent acts of Parliament, he nevertheless consistently opposed the arbitrary measures of the British Ministry for Colonial taxation, and, finding his protests unheeded, resigned in 1770.

BOTHE, bôt The name of two Dutch painters, ANDRIES (c1608-49) and JAN (c1618-52). They were born in Utrecht, the sons of the glass painter Dirk Both, and studied with him and under Abraham Bloemaert. Together they went to Italy, where Andries is said to have been drowned in a canal at Venice, but, though they were closely associated by their work, they took independent lines. Andries may be said to belong to the school of Pieter de Laer, painting genre pictures of peasant life with skill and good coloring. He did not, as is commonly supposed, paint the figures in his brother's landscapes, the uniform character of which usually precludes external assistance. Jan felt the spell of Italian scenery more deeply and devoted himself almost wholly to reproducing it in the manner of Claude Lorrain and with a somewhat monotonous uniformity. Truth to nature, good drawing, and a certain mastery of light effects mark his landscapes, of which good examples, on both a large and a small scale, are to be seen in Amsterdam, The Hague, the public galleries of London, Dresden, and New York, and in many private collections. Several etchings of both brothers are also preserved, those of Jan being better executed.

BOTHA, bô'ta, LOUIS (1862-). A Boer general and statesman, born in Greytown, Natal. Botha early distinguished himself as an officer in the Boer army in the War of 1899-1902. From field cornet under General Meyer, Botha rose rapidly to high rank. He commanded the army besieging Ladysmith, defeated the English at Colenso, and became, after the death of General Joubert, in 1900, commander in chief of the Boer army. Botha now continued the struggle with signal determination, and though his capital, Pretoria, was captured, it was not till 1902 that he surrendered. Botha carried on for his defeated people the peace negotiations with Great Britain, and when the latter country finally bestowed autonomous government upon the conquered territory, became the first Prime Minister of the Union of South Africa (qv). In 1907 he represented his country at the famous colonial conference held in London, in 1911 received honorary degrees from Oxford, Cambridge, and Glasgow, and in 1912 was made an honorary general in the British army. In 1913 Botha was confronted by two crises the first, a labor dispute of grave proportions, he succeeded in settling, temporarily at any rate, the other, a disruption within his own political party, the Boer, or South African, ended in what appears a permanent succession to power of General Hertzog and the more irreconcilable of the Boers, who long have chafed at the moderate British sympathies of Botha.

BOTH'NIA. The name formerly given to

the territory on both sides of the Gulf of Bothnia. The eastern portion has been included in Finland since 1809. The western belongs to Sweden.

BOTHNIA, GULF OF (ML, for Scand. *botten*, lake, sea). The most northerly part of the Baltic Sea, having on its eastern shore Finland, on the western, Sweden. The submarine ridge on which the Åland Islands stand cuts off the Baltic proper from the Gulf of Bothnia. Its length is 415 miles, and its breadth from 93 to 149 miles. Its depth varies from 164 to 330 feet, but both along its shores and in the middle are many small islands, sand banks, rocks, and cliffs, called *skaers*, which render the navigation difficult, though on the whole it is less dangerous than other parts of the Baltic, and has many good harbors. The rivers which fall into this gulf, both from Sweden and Finland, are numerous, and the waters of the gulf itself are but slightly salt. In winter it is usually frozen so hard that the journey from Sweden to Finland can be made on sledges. The shores of the gulf are gradually rising, as has been observed since the middle of the eighteenth century, causing increasing shallowness of its ports. The rise of the bottom is estimated at nearly 5 feet per century. (Map: Russia, B 2).

BOTHWELL, bōth'wēl. A village in Lanarkshire, Scotland, on the right bank of the Clyde, 9 miles east-southeast of Glasgow (Map: Scotland, D 4). The river is here crossed by the celebrated *Bothwell Brig*, near which occurred the bloody encounter between the Covenanters and the Royalists under Monmouth on June 22, 1679, when the former were defeated. Near the village are the fine Norman ruins of Bothwell Castle, to which the Earl of Bothwell carried Mary, Queen of Scots. Pop. of the parish in 1911, 6200. Consult Duncan, "Bothwell Castle," in *Archæological Journal*, vol. xlv (London, 1889).

BOTHWELL, JAMES HEPBURN, fourth EARL OF (?1536-78). A Scottish nobleman, husband of Mary, Queen of Scots. He was born probably in 1536 or 1537, and was brought up and educated by his granduncle, Patrick Hepburn, Bishop of Moray, at Spynie Castle. His character was vicious and unruly. On his father's death in 1556, as Earl of Bothwell and one of the most powerful nobles in Scotland, he proved himself an irreconcilable enemy of the English. At first he opposed the Reformation party, but on their accession to power changed his politics, and in 1561 formed one of the deputation of lords sent to convey the youthful Queen of Scotland to her kingdom. He was shortly after made a Privy Councillor; but his violence and misconduct became intolerable, and he was ordered to quit Edinburgh. In March, 1562, he and the Earl of Arran were committed to the castle for conspiracy to seize the Queen's person. Bothwell made his escape, was recaptured at Holy Island, again got free, and sailed to France. He speedily returned, but, finding Moray close on his trail, embarked for the Continent. Not appearing at his trial, he was outlawed. In 1565, after the Queen's marriage with Darnley, he reappeared, and, having strongly espoused her cause against Moray and his party, was restored to favor and high influence. In October, 1566, while performing a judicial tour in Liddesdale, he was attacked by an outlaw and wounded. The Queen rode 20 miles and back to see him, a journey which brought on a dangerous fever. At Craigmillar,

some time after, Bothwell attempted, unsuccessfully, to overrule her objections to a divorce from Darnley. On the night of Feb. 9, 1567, Darnley was blown up at the Kirk of Field. Public opinion charged Bothwell with the murder, and he was formally indicted, March 28. He came to the trial attended by 4000 followers and received an easy acquittal. Two days after he carried the sword of state before the Queen at the opening of Parliament, and at its close all his lands and offices were confirmed to him. The leading nobles signed a bond approving of Bothwell's acquittal, and, commending him as a fit husband to the Queen, pledged themselves to stand by him. On April 24 Bothwell, accompanied by a strong force, carried off the Queen to Dunbar Castle, on May 6 he was divorced from his wife, and on the 15th his marriage with Mary was solemnized at Holyrood. He had previously been created Duke of Orkney. His triumph was short; the wrath of the nation was roused; at the end of one month Mary was a prisoner in Edinburgh, and Bothwell, pursued in his voyage to the Orkneys, where he had collected a small navy and turned pirate, fled to Norway, whence he was sent under arrest to Denmark, and there imprisoned for the rest of his life. The confinement drove him insane, and he died at Dragsholm Castle in 1578, leaving no heirs. His titles and estates were forfeited to the crown. Consult: Schiern, *Life of Bothwell* (Edinburgh, 1880); Ellis, *Later Years of James Hepburn* (1861); Burton, *History of Scotland* (Edinburgh, 1873).

BOTOCUDO, bō'tō-kōō'dō (Portug. *botoque*, plug; see below), or AIMORÉ. A Tapuyan tribe living in the Sierra dos Aimorés and on the Rio Doce and Rio Pardo, in Minas Geraes, in southeastern Brazil. They are undersized, their features are repulsive, and their grade of intellect is very low. Until brought under subjection by the government, they were naked cannibals. The name *Botocondo*, 'barrel bung,' was given them by the Portuguese in allusion to large wooden labrets and ear blocks. The *Botocondos* have a sort of flute or pipe made of cane. Some anthropologists think the *Botocondos* are a relic of "paleo-American man," represented also by the "fossil man" of the caves of Lagoa Santa, the *sambagus* (shell heaps), etc., and possibly likewise by some of the *Fuegians*. Consult: Ehrenreich, *Ueber die Botocondos* (Berlin, 1887); Gensch, *Die Erziehung eines Indianerkindes* (Wien, 1908); Rey, *Etude anthropologique sur les Botocondos* (Paris, 1880); Rudolph, *Wörterbuch der Botocondensprache* (Hamburg, 1909). See TAPUYA.

BOTONE, or BOT'TONY (OF. *botonné*, from *loton*, Fr. *bouton*, button). In heraldry, a cross botoné is a cross of which the ends are in the form of buds or buttons.

BOTOSHANI, bō'tō-shān'y'. A town of Rumania, in Moldavia, situated 60 miles northwest of Jassy, on a branch line of the Lemberg-Czerowitz-Jassy Railway, and on a small branch of the Jijia River (Map: Turkey in Europe, F 1). It is irregularly built and contains a lyceum and a theatre. The town has manufactories of glass, sugar, corn, and flour. It carries on a large trade in cattle, grain, petroleum, and wood. Pop., 1900, 32,183, of whom one-half were Jews; 1905, 33,320; 1911 (est.), 34,000.

BO TREE. The name given to the sacred fig tree, *Ficus religiosa*, or pipal (see PEERUL), under which the Buddha, Prince Siddhārtha, sat

during the night in which he received supreme enlightenment and attained to the Buddhahood. As *bo* tree literally means 'Tree of Wisdom,' from Sinhalese *bo* = Skt Pali *bodhi*, wisdom, enlightenment, the name is applicable to any tree under which a Buddha receives the great spiritual enlightenment. The particular *bo* tree, or pipal, under which the Śākya sage, Gotama, was seated when he became Buddha, was situated at Uruvelā, the modern Gayā, in Behar, 150 miles southeast of Benares. The scene is described in the Pali writings of the Buddhists, and is familiar to English readers in Sir Edwin Arnold's *Light of Asia*. The spot is marked by an ancient temple, nine stories high, which is now undergoing restoration. The present *bo* tree at Gayā can hardly itself be very old, but it is one of the two most venerated trees in the world. The second sacred *bo* tree is situated at Anurādhapura, in northwestern Ceylon. This is said to be the oldest historically authenticated tree in existence. It is stated that when Buddhism was established in Ceylon the Buddhist abbess Sanghamittā, a sister of the royal missionary Mahinda, brought a branch from the original *bo* tree at Gayā, and planted it at Anurādhapura, 245 B.C. From this branch the present tree grew up, and its history is traced in the native chronicles. Its leaves are most sacred relics for the thousands of Buddhist pilgrims that visit it.

BOTRYCHIUM, *bo-trik'-tūm* (Gk *βότρυχος*, a curl or lock of hair, *βότρυς*, *botrys*, grape cluster, refers to its fruit clusters). A genus of ferns of the family Ophioglossaceae, having a short, erect rootstock, with clustered fleshy roots, bearing a leaf, one part of which is sterile and fernlike, the other fertile and carrying the clusters of sporangia or spore cases. The only British species is the *Botrychium lunaria* ('moonwort'), a little plant pretty frequent in dry mountain pastures. About a dozen species occur in the United States, the most wide-ranging one being *B. virginicum*. It abounds in many parts of the United States, in the mountains of Mexico, in Australia, in some parts of Asia, as the Himalaya Mountains, and is found also in Norway, although in no other part of Europe. It is large and succulent, and is boiled and eaten in the Himalaya, in New Zealand, etc. It is called rattlesnake fern in some parts of America, from its growing in places where rattlesnakes are found. *Botrychium lunaria* ranges from Colorado to New England, Lake Superior, and sparingly northward. *Botrychium simplex*, a rare species, with small fronds, is found from California and Yellowstone Park to Lake Superior and eastward. *Botrychium lanceolatum* ranges from Colorado to Lake Superior, Ohio, New Jersey, and New England. *Botrychium lunarioides* is found from Massachusetts to Florida in dry, rich woods and shady pastures. *Botrychium ternatum* occurs throughout North America.

BOTRYTIS, *bō-trī'tis* (Gk *βότρυς*, *botrys*, a cluster of grapes). A genus of mold, fungi belonging to the Mucedineae. The plant consists of a mycelium (see FUNGI) of more or less entangled threads, with shoots of the same nature rising up from them and bearing the fructification at their extremity. Most of the species live upon dead leaves, decaying wood, and other vegetable material. Some are found on living animal tissues, whether always previously diseased or not is a question still unsettled. A

remarkable species of this genus is the *Vusicainae* (qv). Many of the species of *Botrytis* belong to fungi whose life history is not fully known, the *Botrytis*, or conical stage, being the only form discovered. A number of *Botrytis* forms are known to produce disease in plants by attacking them through their young tissues, but most of the fungi causing diseases, formerly referred to species of *Botrytis*, are now referred to other genera. *Botrytis douglasii* is the cause of a destructive disease of the Douglas fir and other conifers. *Botrytis cinerea*, which causes the ripe rot of grapes, is now referred to *Sclerotinia fuckeliana*, and a number of other species of *Botrytis* are considered as belonging to *Sclerotinia libertiana*. The potato-rot fungus once referred to *Botrytis* is now called *Phytophthora infestans*.

BOTT, JEAN JOSEPH (1826-95). A German violinist. He was born in Cassel, Germany, where he received his first musical instruction from his father, the court musician. After further studies with M. Hauptmann and L. Spohr, he won the Mozart scholarship (1841), and successively became solo violinist in the Electoral orchestra (1846) and court kapellmeister at Meiningen (1857) and Hanover (1865). In 1885 he came to New York, where he died. His works comprise two operas—*Der Unbekannte* (1854) and *Altea, das Mädchen von Korinth* (1862)—and symphonies, overtures, violin concertos, pianoforte music, solos for violin, and songs.

BOT'TA, ANNE CHARLOTTE LYNCH (1820-01). An American author, born in Bennington, Vt. In 1885 she married Vincenzo Botta. She published a book of poems (1848), besides many essays and reviews, promoted the establishment of Barnard College, and founded the prize awarded every five years by the French Academy for the best essay on "The Condition of Women." Her *Handbook of Universal Literature* (1860, new ed., 1902) has been widely used as a textbook.

BOTTA, CARLO GIUSEPPE GUGLIELMO (1766-1837). An Italian historian, born in Piedmont. As a young physician he entered vigorously into the spirit of the French Revolution, was imprisoned in Piedmont (1792), and later served with Napoleon, who rewarded him with various appointments in Piedmont. He was a consistent supporter of Italian independence. He brought new standards of accuracy and elegance into historical writing in his *History of the American War of Independence* (1809), which has remained a classic in the subject, and in his *History of Italy*, which was crowned by the Academy of the Crusca. Consult E. Regis, *Studio intorno alla vita di C. B.* (Turin, 1903), Pavesio, *C. B. e le sue opere storiche* (Florence, 1874), trans. of American War (Philadelphia, 1820).

BOTTA, PAUL EMILE (1802-70). A French archaeologist and traveler. He was born in Turin, the son of Carlo Giuseppe Guglielmo Botta. While still young he undertook a voyage round the world and remained some time on the west coasts of America, where he zealously collected treasures of natural history. In the year 1830 he went to Egypt, where he entered the service of Mohammed Ali (qv) as physician, and in this capacity accompanied the Egyptian expedition to Sennar. Here he formed a very considerable zoological collection, with which he returned to Cairo in 1833. The French

government now appointed him consul in Alexandria, from whence he undertook a journey to Arabia, the results of which he published in a work entitled *Relation d'un voyage dans l'Yémen, entrepris 1837, pour le musée d'histoire naturelle de Paris* (1841). At the suggestion of the Orientalist Julius Mohl, of Paris, he was by the government sent as consular agent to Mosul, and at this place he commenced a series of discoveries which form an epoch in archaeological science. Early in the spring of 1843 he began his diggings in the heaps of ruins at Khorsabad (q.v.), near the Tigris, for monuments of Assyrian antiquity. These excavations revealed much valuable archaeological material, including the ruins of the palace of Sargon II, King of Assyria (722-705 B.C.). The *Journal Asiatique* soon contained accounts of the success with which his enterprise and perseverance were rewarded, and also disquisitions on the extremely difficult subject of the cuneiform writings of the Assyrians, which afterward appeared as a separate publication under the title *Mémoires de l'écriture cunéiforme assyrienne* (1848). The French government took up the matter warmly; Flaminio, a practiced draughtsman, was sent out for the purpose of making sketches on the spot of the sculptures on alabaster, so apt to fall to pieces; and a commission of learned men was appointed for the purpose of conducting the publication of a magnificent archaeological work, which shortly afterward appeared under the special superintendence of Botta himself, with the title *Monuments de Ninive découverts et décrits par Botta, mesurés et dessinés par Flaminio* (1847-50). In 1848 he published the *Inscriptions découvertes à Khorsabad*. In 1846 Botta was appointed consul at Jerusalem, and in 1857 at Tripoli. He returned to France in 1868 and died at Achères, near Poissy. See ASSYRIA.

BOTTA, VINCENZO (1818-94). An Italian-American educator. He was born in Piedmont, Italy, was educated at the University of Turin, became a professor there, was elected to the Sardinian Parliament in 1849, and was appointed commissioner to examine the German educational system in 1850. He came to the United States for the same purpose in 1853 and soon afterward was naturalized and appointed professor of Italian language and literature in the University of New York. He remained in this position till his death. In 1855 he married Anne Charlotte Lynch, a well-known author. His best-known works are: *Account of the System of Education in Piedmont; Character and Policy of Cavour* (1862); *Dante as a Philosopher, Patriot, and Poet* (1865); *Introduction to the Study of Dante* (1886); and "An Historical Sketch of Modern Philosophy in Italy," in Ueberweg's *History of Philosophy from Thales to the Present Time* (1872).

BOTTALLA, bôt-tâl'la, PAOLO (1823-). An Italian historian. He was born in Palermo, Sicily, and was educated at the Jesuit colleges in his native city and in Rome. He subsequently held successive professorships in Church history and theology in Palermo, in Rome, at the College of St. Bruno, Wales, and in Poitiers. He wrote in the Italian, French, and English languages, among his works being the following: *Corso di storia e di geografia universale* (1860); *L'Autorità infallibile del Papa nella Chiesa e le sue relazioni collo stato* (1880); *The Papacy and Schism* (1869); *The Pope and*

the Church Considered in their Mutual Relations (2 vols., 1868-70); *Pope Honorius before the Tribunal of Reason and History* (1868); *La composition des corps d'après les deux principaux systèmes qui divisent les écoles catholiques* (1878).

BOTTARI, bôt-tr'èrè, GIOVANNI GAETANO (1689-1775). A learned Italian prelate and librarian of the Vatican, born in Florence. Author of numerous works on mathematics, philosophy, theology, and archaeology. He labored with the Academy of the Crusca on the revision of the Italian dictionary and as a purist wrote emendations to Varchi's *Ercolano*, and criticisms of Dante and Boccaccio. His reputation rests largely on his criticism on painting (Fr. trans. by Jay, Paris, 1817), his edition of Vergil from the Vatican manuscript, and his treatises on the catacombs of Rome.

BOTTESINI, bôt-te-zè'nè, GIOVANNI (1821-89). An Italian musician and composer, born at Crema, Lombardy, Dec. 24, 1821. He was one of the greatest performers on the double bass that ever lived, and practically the only one known to fame as a concert soloist. He entered the Milan Conservatory and studied double bass under Rossi and Basili and theory under Vaccai, Piantanida, and Ray. From 1840 to 1845 he was a concert virtuoso throughout Italy. In 1846 he went to Havana, Cuba, where, during his régime as conductor, his opera *Cristoforo Colombo* was produced. During his residence in Cuba he made occasional visits to the United States. In 1848 he made a tour through England; for two years following was conductor at the Théâtre des Italiens, Paris; afterward resuming his concert tours. In 1861 he was appointed conductor at the Bellini Theatre, Palermo, and in 1863 held a similar post in Barcelona. He established in Florence a society for the cultivation of German classical music, conducted the opera at Cairo, Egypt, and at the Lyceum, London, in 1871. Ultimately he settled in Parma and became director of the conservatory there. His oratorio, *The Garden of Olivet*, was given under the composer's direction at the Norwich (England) Musical Festival in 1887. His published works include operas, symphonies, overtures, quartets, etc., but although he wrote many compositions for the double bass, none of these appear to have been published. He died in Parma, July 7, 1889.

BÖTTGER, bêt'kër, ADOLF (1815-70). A German translator and poet, born in Leipzig. He studied at the University of Leipzig and won high praise as a translator of the English poets, especially of the complete works of Byron (1840, and in frequent and variously arranged editions). He also translated the poems of Pope (1842, in collaboration with Olckers), of Goldsmith (1843) and of Milton (1846). He also made renderings of Ossian (1847) and of Longfellow's *Havatha* (1856). His own works, displaying often the influence of English prototypes, especially Byron, include: *Die Pilgerfahrt der Blumengeister* (1851); *Gedichte* (1846; 7th ed., 1851); *Das Buch der Sachsen* (1858); *Neue Lieder und Dichtungen* (1868). His *Gesammelten Dichtungen* appeared in 6 vols. (2d ed., 1880).

BÖTTGER, BÖTTCHER, or BÖTTIGER, JOHANN FRIEDRICH (1628-1719). The inventor of Saxon porcelain. He was born at Schleiz, in the principality of Reuss-Schleiz. He was apprenticed to an apothecary in Berlin, but

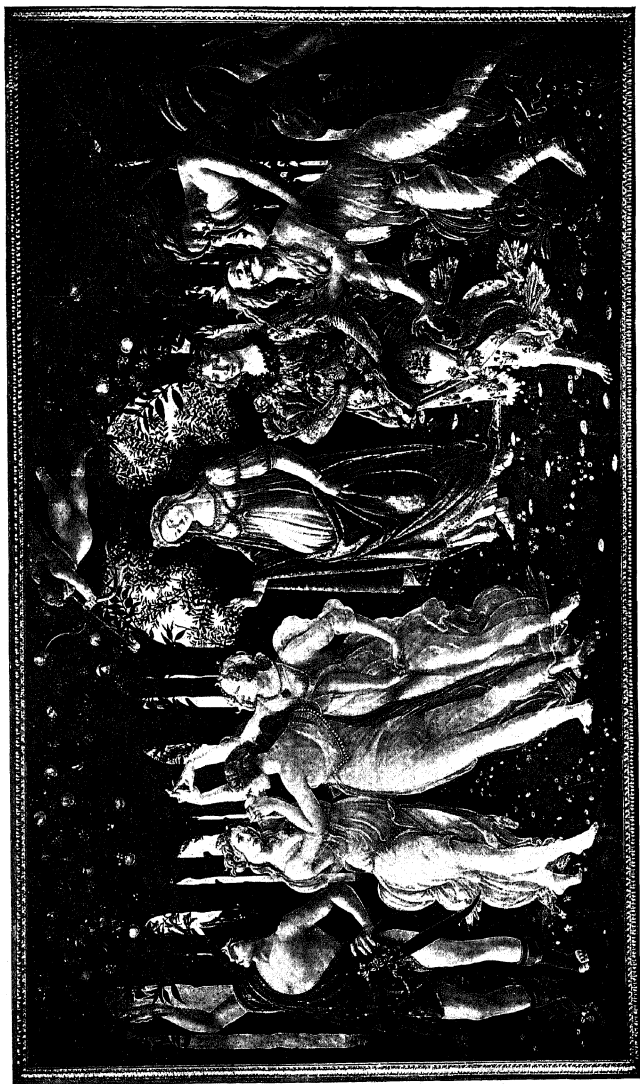
became an enthusiast in the search for the philosopher's stone, and carried on extensive researches under the patronage of Prince Egon von Fürstenberg in Dresden. As he did not succeed in making gold, he was induced to use the chemical knowledge he had acquired in experiments upon clays, with a view to the manufacture of porcelain, and factories for this purpose were erected under royal patronage, and the celebrated Meissen porcelain was the result. As a security against the revelation of the art of making it, Bottger and his assistants were treated as prisoners, and when Saxony was invaded by Charles XII of Sweden in 1706, they were secretly removed from Dresden to Königsberg. His success was not without its reward. He was appointed to supervise the porcelain manufacture in 1708, and shortly afterward the Meissen porcelain was brought out. In 1716 he entered into negotiations to reveal the secrets of the process, but was discovered and imprisoned.

BOTTICELLI, bōt'ti-chē'lli, SANDRO, properly **ALESSANDRO FILIPEPI** (c 1444-1510). One of the most important and representative Florentine painters of the Early Renaissance. The generally accepted account of Sandro's early life, based for the most part on Vasari, has been disproved by recently discovered documentary evidence. From a sworn statement made by his father, Mariano Filipepi, in a tax roll of 1457, it appears that the date of his birth at Florence was within the year beginning March 1, 1444. He is there mentioned as a lad of 13, sickly and (probably) at school. As the fortunes of his father, formerly a well-to-do tanner, had seriously declined, the lad was cared for by his eldest brother, Giovanni, a prosperous broker. From the latter's nickname "Bottaccio" ('small cask'), Sandro's name is derived, and not because he had been apprenticed to a goldsmith of that name. He was, however, apprenticed to his second brother, Antonio, a beater of gold leaf, and not long afterward to Fra Filippo Lippi, then at the height of his career. Filippo's influence appears in his earliest panels, such as the oblong "Adoration of the Kings," in the National Gallery, London, and the diptych illustrating the story of Judith and Holofernes, in the Uffizi. When Filippo left Florence for Spoleto in 1467, the young artist, following a more independent development, was subject to other influences. He was influenced by the realistic school of the Pollaiuoli, especially by Antonio, from whom he learned bodily structure and movement. This appears in the panel "Fortitude," painted to complete a series of seven, ordered from the Pollaiuoli for the Mercanzia ('Court of Merchants') in Florence, now in the Uffizi, and even more so in the nude San Sebastian of the Berlin Gallery. He is also supposed by some authorities to have studied with Verrocchio, but the pictures upon which this assumption is based have been shown by Benson to be the work of another artist, influenced by both Sandro and Verrocchio, to whom the name of Amico di Sandro has been assigned by Benson (See SANDRO, AMICO DI). A good example of his early period is the circular "Adoration of the Magi," with more than 70 figures subtly arranged. Of greater importance is the panel of the same subject painted for Santa Maria Novella, now in the Uffizi—the masterpiece of his early period, which established his reputa-

tion. Simple and original in composition, strong and direct in execution, it shows only in the draperies and the color the lingering influence of Filippo Lippi. It reveals him also as a master of portraiture, for in the three kings and their followers we recognize Cosimo de' Medici, other members of his family, various Florentine notables, and on the extreme right of the painting, Botticelli himself. From this time the Medici and other great Florentine families were his patrons. When in 1478 the Pazzi conspiracy, which well-nigh overthrew the Medicean rule, was foiled, he was commissioned to paint on the walls of the Palazzo del Podesta the effigies of the conspirators hanging by their necks. In 1480 he was commissioned by the Vespucci family to paint on the choir screen of Ognissanti the imposing fresco of St. Augustine. This was the beginning of his rivalry with Domenico Ghirlandajo (qv), whose St. Jerome in the same church he has plainly excelled.

In 1481 Botticelli was summoned to Rome by Sixtus IV, to assist in decorating his newly erected chapel in the Vatican. According to Vasari, whose statement there seems no valid reason to doubt, he was made chief superintendent of the work. His coworkers were Ghirlandajo, Cosimo Rosselli, Pinturicchio, Perugino, and Luca Signorelli. Botticelli himself painted a number of the 24 portraits of popes in the upper niches of the chapel, and three of the twelve frescoes, viz., "The Life of Moses," "The Temptation of Christ," and the "Punishment of Korah, Dathan, and Abiram." These compositions illustrate both the vigor of his imagination and the limitations of his genius, for, while many of the separate groups are strikingly beautiful and exhibit an extraordinary amount of life and motion, there is a want of harmony in the whole, and in several cases the figures are crowded together in confused groups.

Towards the end of 1482 Botticelli returned to Florence. He was now at the zenith of his popularity and received most important commissions from the Medici and other great Florentine families. For Lorenzo the Magnificent he painted extensive mythological frescoes in his villa near Volterra, none of which have survived. In 1490, at Lorenzo's behest, he was appointed one of a commission for the completion of the façade of Florence Cathedral, and to design mosaics for the chapel of St. Zenobius in Florence. His principal patron, however, was a cousin of "Il Magnifico," Lorenzo di Pierfrancesco de' Medici, for whom he painted his greatest mythological pictures, and now drew his remarkable illustrations of Dante. In 1493 Sandro's third brother, Simone, returning from Naples, shared his home. A devout disciple of Savonarola, whose manuscript account of the friar's remarkable career still survives, he no doubt influenced his brother, but the latter was not an early convert. He was probably associated with the Medici until Di Pierfrancesco, the leader of the faction opposed to Savonarola, left Florence in 1497. It is therefore wrong to ascribe the deep religious sentiment of Sandro's later paintings to the friar's influence rather than to his own innate religious temperament. This could only be true of those painted in the last few years of the fifteenth century. In the most famous of his last paintings, the "Nativity" (1500, National Gallery), Savonarola and the two friars who were burned with him are represented as received by angels in Para-



BOTTICELLI (ALESSANDRO FILIPEPI)
"PRIMAVERA" (SPRING) FROM THE PAINTING IN THE ACADEMY
OF THE FINE ARTS, FLORENCE

dise, and the painter, in a Greek inscription, affirms his faithfulness to the cause. This and later works, some of them pagan, sufficiently refute Vasari's statement that in his religious frenzy Sandro entirely abandoned painting and was reduced to misery and want. Besides, Botticelli's income tax for 1498 shows that he was then keeping house with his nephew in Florence, and at the same time possessed "a gentleman's villa" and vineyards outside the gates of San Frediano. His father, too, seems to have been in comfortable circumstances, since in 1510 he purchased the family vault in the Church of the Ognissanti, where Sandro was buried, May 17, 1510.

Probably no artist in the entire range of the Italian Renaissance has evoked such contrary opinions of his merits as has Botticelli. As has been seen, his reputation among his contemporaries was the highest; but later, when the merely technical excellences of the art of painting had assumed an exaggerated importance, he went out of favor, and for 300 years his work was not considered as a factor in the development of art. To-day, however, with the realization of the great importance of the Early Renaissance, Botticelli has fully regained favor. One reason for his present popularity is that in the breadth and richness of his culture, in the varied character of the subjects he chose, and in the greatness of his aim, he represents the most striking features of the memorable period in which he lived. For the range of his subjects extended from the great scriptural compositions, "through the most touching scenes in the life of the Virgin," to events in classic history, and thus in his works the brilliancy of the Medici's court, the force of Christian traditions, and those classic myths that were the delight of Renaissance scholars, are all present in varying degrees.

But though he is thus a reflex of his time, Botticelli's works are yet pronounced and individual. Living in a generation of naturalists, he might have been a mere naturalist among them. There are traces enough in his work that he was deeply impressed by nature, by man, and by things considered as plastic objects. The sea, rocky mountain scenery, soft woodland landscapes, and gardens of every variety of rose, appear again and again in his paintings. But Botticelli was essentially a visionary painter, and to represent merely the outward image was not enough for him. Instead, he clothed all he saw with the color of his own moods and ideas, and thus made each of his works an outgrowth of his own personality. In color, too, he showed independence, for while in his youth he used the gay colors common in his age, in his later works his color scheme was more subservient to the central idea and sentiment of his work. He was also one of the first to accept art as an instrument of general culture, and as such at the service of the world as of the Church. But while Botticelli painted religious works, he painted them with an originality of feeling which appeals to the spectator as the real matter of the work through the veil of its ostensible subject. On the other hand, his Venuses have so much feeling and such tender grace that they seem "Madonnas masquerading in mythology."

Nowhere does he give greater proof of his personal feeling and creative energy than in depicting Mary and her Child. The earliest of his Madonnas is the one formerly in the Chigi col-

lection, Rome, but now in that of Mrs. J. L. Gardner, Boston. After his return from Rome he painted his two most important Madonnas—"The Magnificat" (c.1482-83) and its pendant, "The Madonna of the Pomegranate" (1487)—both in the Uffizi. The former, which is named from the text which the Blessed Virgin writes in a book, reveals her dreamy yet passionate, and surrounded by angels with wistful, eager faces; the other, in which six angels are wonderfully grouped about her, is better preserved and of even deeper religious pathos. These two pictures, both circular in form, are the prototypes of many similar Madonnas, like those of the National Gallery (London) and the Berlin Museum, long attributed to Sandro, but really by his school. Other important examples are: "The Madonna with St. John the Baptist and St. John the Evangelist" (1485, Berlin Museum); the great altarpiece of St. Barnabà (now in the Academy), "The Madonna Enthroned with Angels and Six Saints," whose lives are represented in the predella; and the Virgin and Child and three Angels, in the Ambrosiana, Milan. Other important religious paintings are the imposing "Coronation of the Virgin," formerly the altarpiece of San Marco, now in the Academy; the "Last Communion of St. Jerome" (Marchese Farinola, Florence); "St. Augustine in his Cell" (Academy); and the three panels with scenes from the life of St. Zenobius, of which one is in the Dresden Gallery, another in the Metropolitan Museum, New York.

Of his mythological pictures, the earliest, painted prior to the Roman journey, and the most famous, is the one usually known as "La primavera" ("Spring")—a charming composition of classical figures, over life-size, in a beautiful spring landscape, redolent with flowers. The researches of Dr. Warburg have shown that the real subject is "The Realm of Venus," and that it was painted to describe a poem by Poliziano. So was also its companion piece, the "Birth of Venus," which represents the goddess perfectly nude, except for the covering of her wind-blown hair, and wafted ashore by the breath of the wind gods. It is the most chaste and refined treatment of the nude, except perhaps Giorgione's "Sleeping Venus," in modern painting. Both these pictures were painted for Lorenzo di Pierfrancesco's Villa di Castello; the former is in the Uffizi, the latter in the Florence Academy. To the same period as the "Venus" (c.1485-88) belongs "Mars and Venus" of the National Gallery, and "Pallas and the Centaur," an allegory typifying the pacification of the factions by Lorenzo the Magnificent. About 1485, also, he painted the beautiful frescoes of the Villa Tornabuoni, which in a damaged condition now survive in the Louvre: one representing Lorenzo Tornabuoni and the Liberal Arts, the other Giovanna Tornabuoni with Venus and the Graces. To his last period belongs the "Allegory of Calumny" (Uffizi), after Lucian's description of a painting by Apelles, considered by some his masterpiece. Even later in date are the decorative panels representing the "Story of Virginia" (Morelli collection, Bergamo) and that of Lucretia (Gardner collection, Boston), both belonging to his latest period.

Although too mannered to be counted among the world's greatest portraitists, Botticelli has left a few portraits of subtle charm. The authenticity of most of those formerly ascribed to him is disputed. The well-known "Simonetta"

(Uffizi) is no longer considered his work but authorities are generally agreed that the "Young Man with the Medal" in the same gallery and the portrait of a young man in the National Gallery (London) are his handwork. So also is "Giuliano dei Medici," the original being in the Gallery of Bergamo, not in Berlin, as Morelli has shown, and to these should be added, in our opinion, the two beautiful young women in the Berlin and Frankfurt galleries—the latter one of the most beautiful pieces of linear decoration in art.

A picture of Botticelli's art is not complete without mention of his drawings, particularly those intended as designs for engravings. His beautiful print of "Bacchus and Ariadne" (1480) survives in only one example in the British Museum. He also designed 19 small woodcuts for the edition of Dante with commentary by Landino, published in Florence (1481) by Lorenzo della Magna. Finest of all are the remarkable illustrations of the *Divina Commedia*, which he drew for Lorenzo di Pierfrancesco about 1492-95. Eighty-five of these survive in the Berlin Cabinet of Engravings, 11 in the Vatican. Sketched in silver point, they were finished with the pen and a few were completed in color. They are interesting, not so much as illustrations as because they reveal Sandro as the greatest master of the single line, not only of the Renaissance but perhaps of the Western world. In this quality he approaches the Japanese.

Botticelli was at the head of a numerous and important school, to which many of the beautiful paintings attributed to him in European collections are due. The most important of his pupils was Filippo Lippi the Younger (q.v.), less widely known is Bartolommeo di Giovanni, who busied himself with graceful decorations of cassoni (chests) and similar objects. For another important pupil see the article SANDRO, AMICO DI.

Bibliography. The principal sources of information on the life of Botticelli are the original documents published by Hoon and others, and his life in Vasari's *Life* (vol. III, ed. Milanesi, Florence, 1878-83). A convenient English translation is that of Blashfield and Hopkins (New York, 1896). Botticelli's popularity with the English-speaking public was greatly enhanced by the essay of Walter Pater, in his *Studies in the History of the Renaissance* (London, 1873)—an admirable literary effort, but superseded as regards criticism and historic facts. Berenson in his *Florentine Painters of the Renaissance* (New York, 1898), and other publications, was the first to distinguish Sandro's works from those of his school. Herbert P. Horn's admirable folio monograph, *Alessandro Filipepp, Commonly Called Sandro Botticelli* (London, 1908), is in all respects authoritative, and will be followed by a similar volume on his school. Other biographies are those of Umann (Munich, 1893), Philimore (New York, 1894), Steinmann (Bielefeld, 1897, Eng. trans., New York, 1901), Supino (Florence, 1900), Streeter (London, 1903), Cartwright (ib., 1904), Rusconi (Bergamo, 1907), Proffil (Bologna, 1909), Schaeffer (London, 1910), Schneider (Paris, 1911), and Oppé (London, 1912). Consult also Warburg, *Sandro Botticelli's Geburt der Venus und Frühling* (Leipzig, 1893), Lippmann, *Sandro Botticelli's Zeichnungen zu Danies göttlicher Comodie* (Berlin, 1887, Eng. trans., London,

1896). Kroeber, *Die Einzelportraits des Sandro Botticelli* (Leipzig, 1911).

BOTTICHER, bō'ti-kēr, KARL (1806-89). A German archeologist, born in Nordhausen. He studied at the Academy of Architecture in Berlin, and was afterward appointed an instructor in the School of Design of the Industrial Institute there. In 1844 he was appointed a professor in the Academy of Architecture. His chief work is the *Tektonik der Hellenen* (1844-52), a splendid contribution to the study of Greek architecture. Others of his works are *Beicht über die Untersuchungen auf der Akropolis in Athen* (1863), *Der Zophoros am Parthenon* (1875), and *Die Thymele der Athena Nike auf der Akropolis von Athen* (1880).

BOTTICHER, KARL HEINRICH VON (1833-1907). A German statesman. He was born in Stettin, and was educated at the universities of Würzburg and Berlin. He was Governor of Schleswig-Holstein in 1876, Lord Lieutenant of Schleswig-Holstein in 1879, Secretary of the Interior in 1881. In 1888 he became Vice President of the Prussian Ministry of State, and as the representative of the Chancellor introduced numerous social reforms, and the enactment of the invalid and old-age insurance laws, in 1889, was due principally to his splendid energy and executive ability. From 1898 to 1906 he was Lord Lieutenant of Saxony, and in 1901 became a member of the Upper House of the Prussian Diet.

BOTTICHER, PAUL. See LAGARDE, PAUL ANTON DE.

BOTTICINI, bō'ti-chē'ne, FRANCESCO (1446-97). A Florentine painter. He was a pupil of Neri di Bicci, but, according to Berenson, was influenced by Castagno, formed under Cosimo Roselli and Verrocchio, and later a follower of Amico di Sandro. Little is known concerning his life. His works were formerly attributed to other masters, especially to Botticelli, but thanks to modern research and criticism, especially that of Berenson, he has emerged as a distinct artistic personality. Heterogeneous influences can be traced in all his pictures. Thus "St. Jerome" in the National Gallery (London) recalls Castagno's apostles, his Madonnas recall Filippo Lippi, his angels Botticelli, his draperies Verrocchio, and his landscapes Baldovinetti and the Pollaiuoli. The artistic quality of his pictures is as different as their style, but the best of them rank with the highest achievements of the fifteenth century. Such are "The Assumption of the Virgin" (National Gallery, London), the "Portrait of a Young Man" (Royal Palace, Stockholm), the "Madonna and Child with St. John and Angels" (Pitti Palace, Florence), formerly attributed to Filippo Lippi, "The Annunciation" (Empoli), and finally the much disputed picture of the Florence Academy, "Tobias and the Three Angels." The Metropolitan Museum, New York, possesses two examples of his work.

BOTTIGER, bō'ti-gēr, CARL VILHELM (1807-78). A Swedish scholar and poet. He was born in Westeras, and studied at the University of Upsala, where, after extensive travel, he was appointed professor of modern literature in 1845, professor of aesthetics in 1856, and in 1858 professor of modern languages and literatures, from which post he retired in 1867. He was exceedingly active as translator, poet, dramatist, and literary critic. Most of his publications in the latter capacity appeared among the *Translations*

of the Swedish Academy. It is perhaps by his graceful verse that he is known to best advantage. His publications include: *Lyriska stycken* ('Lyrical Pieces,' 1837-39); *Religiösa sånger* ('Religious Songs,' 1841); and translations of Tasso's *Gerusalemme Liberata* (1842-51), and Dante's *Divina Commedia* (1845-51). His collected works appeared at Stockholm (6 vols., 1855-51).

BÖTTIGER, KARL AUGUST (1760-1835). A German archaeologist. He was born at Reichenbach, in Saxony, and studied in Leipzig. In 1791, chiefly through the influence of Herder, he was appointed director of the gymnasium and consistorial councillor at Weimar. Here he enjoyed the stimulating society of Herder, Wieland, Goethe, and others. His literary activity at this period was prodigious. He edited several journals and wrote multitudes of reviews, biographical notices, etc., for the *Allgemeine Zeitung*. In 1804 he was called to Dresden, where he began to deliver lectures on special branches of classical antiquities and art. In 1832 he was elected a member of the French Institute. Among his important works are *Sabina oder Morgenscenen im Putzzimmer einer reichen Römerin* (Leipzig, 1803; 3d ed., Munich, 1878), a study of the household life of the Roman women; *Die Aldobrandinische Hochzeit* (Leipzig, 1810); *Kunstmythologie* (Dresden, 1811); *Vorlesungen und Aufsätze zur Alterthumskunde* (Leipzig, 1817); *Amalthea oder Museum der Kunstmythologie* (3 vols., Leipzig, 1821-25); *Ideen zur Kunstmythologie* (2 vols., Dresden and Leipzig, 1826-36). His minor writings in Latin and German were collected by Sillig and published in 1837-38. Consult Carl Vilhelm Böttiger, *Karl August Böttiger. Eine biographische Skizze* (Leipzig, 1837), and his *Litterarische Zustände und Zeitgenossen* (Leipzig, 1838), which he published from his father's papers.

BOT'TLE (Fr. *bouteille*, dim. of *botte*, *boute*; from LL. *buticula*, dim. of *but[t]is*, *butta*, flask, Eng. *butt*). A vessel, generally of a round shape, with a narrow neck, for holding liquids. Bottles are now usually made of glass or earthenware; but the first bottles were made of the skins of animals, mostly goats. Of this kind were the bottles spoken of in Scripture. Skin bottles are still used in southern Europe for the transport of wine and water, and by tribes of Africa and Asia for carrying water. The ancient Egyptians made bottles of most elegant form and exquisite workmanship, of alabaster, stone, gold, ivory, and other substances. The Italian peasants carry, slung round their necks, bottles made of the rind of the gourd, which, when dry, is as hard as wood. Bottles made of glass will be treated under GLASS.

BOTTLE CHART, BOTTLE PAPERS. A chart which purports to show the track of sealed bottles thrown from ships into the sea. It is a well-known practice, on long voyages, to throw sealed bottles containing some intelligence into the sea, in the hope that these messengers may be picked up, and the information inclosed may reach its proper destination. The frequency of these instances at length led to the inference that by such means the determination of currents might be illustrated. Lieutenant Beecher, an English naval officer, has the merit of having constructed, in 1843, a chart of bottle voyages in the Atlantic, his facts being drawn from the numerous cases that had occurred. The time

which elapses between the launching of the bottle from the ship and the finding it on shore, or picking up by some other ship, has varied from a few days to 16 years; while the straight-line distance between the two points has varied from a few miles to 5000 miles. Of the actual length of the curved line followed by the bottle, little or nothing is known; but some are believed to have exceeded 8000 miles. The bottle chart has been reedited and reengraved from time to time, and published in the *Nautical Magazine*; it is marked by several hundred straight lines, each drawn from the latitude and longitude of immersion to the latitude and longitude of the finding. Charts of this sort are now prepared at the United States Hydrographic Office, not for general circulation, but for information of the office; and from the records thus established current charts are prepared and corrected. Papers printed in several languages are furnished by the hydrographer to masters of ships for the purpose of putting in bottles; the paper contains a request for their return when found to the nearest United States consul, who will forward them to Washington, with a statement in regard to the circumstances of their discovery.

BOTTLE FISH, BOXFISH. See SWELLFISH.

BOTTLE GLASS. See GLASS.

BOTTLE GOURD (gourd used for making bottles; see below), *Lagenaria*. A genus of plants of the family Cucurbitaceae, nearly allied to the gourds (*Cucurbita*). One of the most marked distinctions between *Lagenaria* and *Cucurbita* is the very swollen border of the seeds of the bottle gourds, which have also all the anthers separate and have white flowers, while those of the gourds proper are yellow. The single species of bottle gourd (*Lagenaria vulgaris*) is a native of Central Asia and tropical Africa, but is now common almost everywhere in warm climates. It is a climbing, musky-scented annual, clothed with soft down, having its flowers in clusters, and a large fruit, from 1 to even 6 feet in length, which is usually shaped like a bottle, an urn, or a club. The fruit has a hard rind and when the pulp is removed and the rind dried, it is used in many countries for holding water, and is generally called a calabash. The bottle gourd in its wild state is very bitter, and is said to be poisonous, and even in cultivation some of its varieties exhibit not a little of the bitterness and purgative properties of colocynth. The bottle gourd appears to have been introduced into Europe about the close of the sixteenth century; but it requires for its advantageous cultivation a warmer climate than that of any part of Great Britain, where, although it succeeds well enough in a hotbed, it is chiefly known as an object of curiosity. It is, however, much cultivated in warmer countries as an esculent, and is an important article of food to the poorer Arabs, who boil it with vinegar, or make a pudding of it in its own rind with rice and meat. It is also used when young as we employ summer squash. This plant is often grown in the United States, where it is known as Hercules' club, sugar trough, snake, dipper gourd, etc. For illustration, see CUCUMBER.

BOTTLEHEAD, or BOT'TLENOSE (so named from the shape of the snout, or head). A whale (*Hyperodon rostratum*) closely allied to the sperm whale, frequenting the Arctic and North Atlantic. It reaches a length of 30 feet and has the snout produced into a beak, as in the dolphins; the forehead rises suddenly from

the beak, and is remarkably elevated, owing to large bony crests rising over the bones of the upper jaw. The teeth are only two in number and are situated in the fore part of the lower jaw, pointed, but sometimes completely hidden. There is a dorsal fin, rather small in proportion to the size of the animal, and placed farther back than in the common dolphin. The blowhole is crescent-shaped, the points of the crescent directed backward. The skin is smooth and glossy, of a blackish lead color on the back, gradually becoming lighter on the sides, and whitish on the belly, turning yellowish brown in old age.

These small whales travel in bands or "gangs," as they are technically called, of 4 to 10 or even 15, and keep just south of the limits of the Arctic ice, moving northward in summer and southward in winter. They are active, leaping out of the water and when in mid-air can turn their heads from side to side. These whales can also remain under water for long periods, two hours appearing to be the limit, observed in the case of a harpooned whale. The voice is said to be more like a sob than a bellow. They are curious rather than alarmed by the presence of boats. They feed mainly on squids, for which they are believed to dive to a very great depth. They are pursued and harpooned for the sake of their oil, resembling and equal to sperm, of which a large one will yield two tons, besides 200 pounds of spermaceti.

The same name is often applied to several other of the smaller cetaceans, such as dolphins and blackfish, with protruding snouts.

BOTTLENOSE In Great Britain, a puffin (qv).

BOTTLE TREE (so named from the shape of the trunk and the water it contains, see below), *Sterculia rupestris*. A native of Australia, noted for a great globular expansion between the ground and the branches, or, where the soil is without rocks, for a trunk in the shape of an ordinary bottle, the limbs appearing to grow from the mouth. It belongs to the family Sterculiaceae and is of middling stature. The wood is soft and brittle, the leaves are from 2 to 4 inches long, entire, stalked, and lance-shaped, the flowers inconspicuous, on short panicles, arising from the axils of the leaves, calyx in the staminate flower, five-cleft, the stamens numerous, the fruit, of five-stalked, leathery folioles, containing six seeds. According to Von Muller, the stems of this tree hold considerable quantities of water, a fact often taken advantage of by travelers and the aborigines, who cut holes into the soft wood to get the supply of water. There are a number of other species to which the name "bottle tree" is applied. Some of them are important food plants of the natives of Australia, who eat their roots, which are filled with a gum similar to gum tragacanth. For illustration, see **BREADFRUIT TREE**.

BOTTLING Bottling is a very general term for a process practiced wherever liquids and some kinds of merchandise are placed in bottles for preservation or sale. In this article only the bottling of beverages, alcoholic and nonalcoholic, will be described. The subject can be best treated if it is divided into four classes, viz., wines and liquors, beer and malt liquors, carbonated beverages, mineral waters.

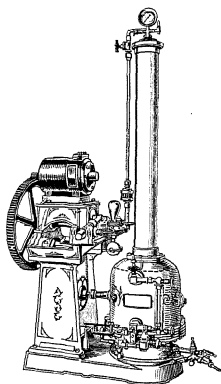
Wines and Liquors Wines, including champagne, and liquors generally are bottled in every civilized country the world over. In France, where the wine production is on an enormous

scale, and where most of the champagne is produced and bottled, the bottling industry naturally is large and important. It is also quite extensive in Germany, while in Spain and Portugal there is less actual bottling done, as the celebrated wines from those two latter countries are shipped for the most part in hogsheads, and the contents bottled in the country of their destination. In Italy most of the wines for export are bottled. In England wine bottling is on a much smaller scale, while alcoholic liquors, chiefly whisky, gins, etc., are bottled extensively. In the United States the wine industry is really in its infancy, the production being mainly in California, Missouri, Ohio, and New York, and most of the bottling is done at the wine centres, while alcoholic liquors, such as whisky, etc., are bottled in various States, mostly under the supervision of the United States government.

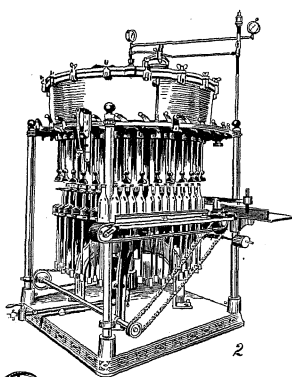
Beer and Malt Liquors Beer and malt liquors are bottled to a very large extent in England, but very little on the continent of Europe, excepting in Germany, but even there most of the beer for export is shipped in barrels to be bottled in the country of its destination. In the United States the production of bottled beer is on an enormous scale, and probably nearly every brewery has its own bottling plant. Accordingly brewery bottling has become highly developed and has come to be known as the best of its kind, for the beer is taken from the vats in the brewery, and allowed to run through pipes in tunnels under the street, according to United States Internal Revenue regulations, and bottled in the bottling shop, which must be located across the street from the brewery. It is therefore prepared under the best of circumstances, the measurements being taken by United States inspectors for the purpose of the stamp tax. Furthermore the air contact is minimized from the time it leaves the vat until it is stoppered within the bottle. It is then steamed or pasteurized, the name being in honor of Pasteur (qv), who first discovered the germ theory in connection with bottled liquids. The steaming or pasteurizing process is done by placing the bottles either in a covered steaming tank or a revolving pasteurizing machine, and the temperature of the liquid contents raised to 140° F. It is then allowed to cool naturally, and after about an hour the bottles are labeled and ready for shipment.

Carbonated Beverages In the United States this particular designation covers all that class of bottled nonalcoholic beverages or "soft" drinks which first have been siruped in the bottle, after which the bottle is filled with water previously surcharged with carbon dioxide (CO₂), or, more popularly "carbonic gas." Such beverages are variously and popularly known as ginger ale, sarsaparilla, lemon soda, lemon sour, cream soda, a number of other specially flavored beverages of this character and kind being known under a variety of names. There are probably about 10,000 bottling establishments in the United States, Canada, Mexico, and the West India Islands engaged in the manufacture of carbonated beverages. A great many of these establishments also prepare or bottle what are called siphon waters, or, more properly speaking, artificial mineral waters, such as Vichy, Selters, Kissingen, etc. In England the trade is known more popularly as the aerated-water trade, although the class of goods is of pretty much the same nature as in the United States.

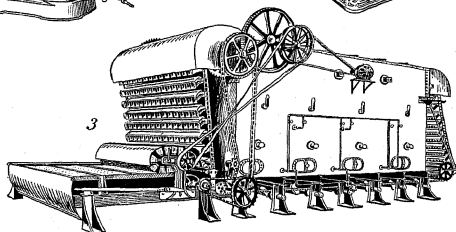
BOTTLING MACHINERY



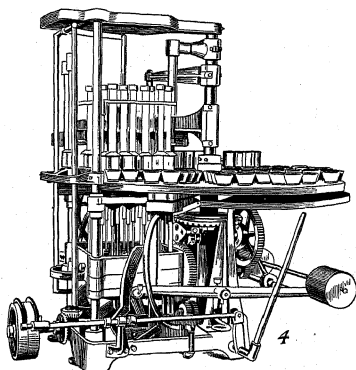
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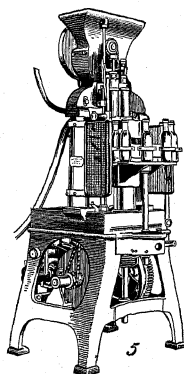
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1. CARBONATING APPARATUS.

2. BEER BOTTLE FILLER.

3. FOUR-COMPARTMENT SOAKER WITH BRUSH DEVICE ATTACHED.

4. BOTTLE WASHER.

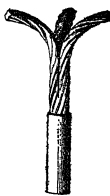
5. AUTOMATIC CROWN SODA WATER BOTTLING MACHINE.

In England, in addition there is a beverage known as ginger beer, which is a fermented product, put up in stoneware bottles. The siphon water trade in England, carried on on a large scale, is probably the most up-to-date in the world. In Germany nonalcoholic carbonated beverages are mostly known by the popular title of *limonades*, although various flavors are used to designate the different drinks. In France, Italy, Portugal, and Spain the trade in this class of goods is not very extensive.

Mineral Waters. The bottling of natural mineral waters is done wherever such springs abound, and in the bottling and export of natural mineral waters Germany and France probably take higher rank than any other countries in the world. Spain has several popular mineral-water springs, the product of which is bottled mostly for export. In the United States there are about 1000 flowing natural mineral-water springs, many of them, however, supplying merely local demands. There are, however, a number of natural mineral water springs, in New York, Wisconsin, Maine, Missouri, Massachusetts, California, Virginia, Pennsylvania, Texas, and Indiana, where the mineral waters are bottled, both still and carbonated, on a very large scale, and shipped to all parts of the United States. It should be said, though, that some of these so-called natural mineral waters are really not waters that are mineralized, and the industry has come to class them as mineral and nonmineral; i. e., any water that contains say about 8 to 10 grains of different minerals in solution to a United States gallon would be classed as a mineral water, while all the waters having less would be classed as nonmineral waters or table waters. There was produced and sold in the United States in the year 1912 a total of 62,281,201 gallons of mineral water, which was said to have an average value of 10½ cents a gallon. It might be said further that upward of 5,000,000 gallons of mineral, or rather nonmineral waters from such springs were used in the bottling of various nonalcoholic beverages during the same year.

Bottling Machinery, Appliances, and Accessories. Some or all of the following proc-

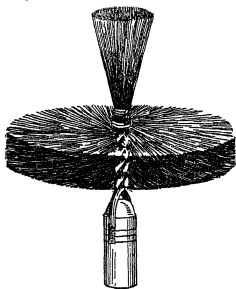
ing, tinfoiling, or capsuling the bottles. Clean bottles are strictly essential for all classes of bottled beverages, especially if intended for long-distance shipment or foreign countries.



RUBBER BRUSH FOR RINSING BOTTLES.

New bottles are put through the same course of cleansing as the old bottles; for in many industries the bottles are used repeatedly and must be cleansed as often as they are returned to the bottling establishment. To wash bottles properly they should be soaked in tanks containing hot water in which is dissolved some kind of an alkali or other cleansing solution, such as caustic soda. Soaking machines are now in use in all first-class establishments. These machines contain pockets or spindles in which the bottles are placed bottom downward at an angle of about 45°. The weight of the bottles helps to operate the machine, although it is power driven and regulated, and the wheel carrying the bottles revolves slowly through the hot water containing the cleansing solution in the tank. After the bottles have been thus soaked, interior and exterior, they are again immersed in hot water, and as the layers of bottles come out of this clear hot water the angle of suspension is reversed and the bottles are drained of all contents. They are then washed or scrubbed by means of brushes revolving at high speeds. Such machines are operated in connection with the soaker, automatic or otherwise. When operated automatically, the bottles are carried by a conveyor from the soaker to the washer, where they are scrubbed, inside and outside, placed upside down on a rinser, and again automatically conveyed to the filling machines. The brushes are made both of bristle and rubber, the latter having two, three, and four prongs which are spread by centrifugal action. The bottle-soaking machines are made in different sizes, with a capacity of from 5000 to 50,000 bottles per day.

The filling process in the case of wines, whiskies, etc., still partakes of the old methods, and often, especially in European countries, the bottles are corked by mallet-driven corks or some old-style machine that has been in use for many years. In the Champagne district of France a peculiar machine is employed which spreads the cork and gives it that peculiar formation on the part of the cork which is not driven into the bottle. Whisky and wine corks, however, are driven even with the neck of the bottle. In the bottling of beer the method now used is a counterpressure system, the beer from the barrel being emptied into a reservoir in the machine proper. A rotary automatically operated spindle machine of varying capacities will fill, in the case of a hand machine, about 1500 pint bottles per hour, while the power-driven, large rotary machine will bottle about 5100 pints per hour. The bottles, when filled, are removed or transferred, sometimes by hand, but in large plants by automatic conveying machinery, to what is known as a crown-capping machine. These machines, which make use of the single-service cap or stopper, have almost revolutionized the bottling industry in the United States. The so-called crown cap they employ is made from



BRISTLE BRUSH FOR CLEANSING BOTTLES.

esses, for the different classes of goods, usually are involved: (1) cleansing the bottles; (2) cleansing the corks where the natural cork is used; (3) filling, corking, crown capping, label-

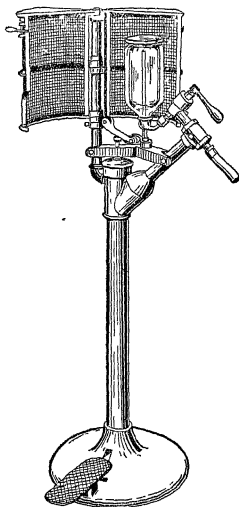
tinned iron, cut out and stamped with a corrugated edge, in one operation. Next to the metal in the shell are placed a prepared paraffin paper and a thin sheet cork. This sheet of paraffin paper answers a double service, viz, to prevent the liquid from reaching the metal and also assisting in an adhesive way to retain the cork in its proper place while the cap is being handled.

This crown cap has all but driven other stoppering devices out of the market, and it is safe to say that in the United States alone at least 150,000 gross of such caps are used daily, as they have been found clean, sanitary, and attractive. The capping machines are ingenious, the caps being fed through the throat of the power machine to the top of the bottle, where they are crimped over the top and around the edge or mouth of the bottle, the cork acting as the seat or seal, which must be gas-tight. A foot-power beer machine with a single operator will cap about 900 pint bottles per hour while the large power-driven capper will cap about 5500 pint bottles per hour.

In the manufacture and bottling of carbonated beverages the system, as well as the machinery or apparatus, is entirely different. In France the method is known as a continuous system, where use is made of a fill machine with a copper cylinder in which the water and gas are driven together. In England the system is also called continuous, but the machinery is heavier, made of cast iron, lined with block tin, and of larger size, but not of larger capacity. It is the old system in both countries, handed down for several generations back. In the United States the early pioneers in the industry used what was known as the intermittent system, a generator on one end connected or piped to two or more cylinders in which the water was charged or carbonated. In the generator was placed the marble dust with a vitriol chamber on top, and these two ingredients were mixed with a certain amount of water which liberates the carbon dioxide (carbonic gas) in the marble dust or carbonate of soda, which gas being under pressure rose from the mass and was forced through pipes over into the water cylinders, where with the necessary agitation it became mixed with the water. Later days have seen the introduction, however, of a continuous (column) system. The column may be filled with particles of glass or marbles or other obstructions, in order to break the continuity of the stream of water, which is pumped in at the top of the dome. The gas is admitted at the bottom of the dome, and as it rises meets the downcoming water through the various interstices, and thus the water and the gas are mingled together. From the reservoir below the charged or carbonated water is led through pipes to the filling or bottling machine. The system generally employed, aside from a refrigerator plant, consists of taking water directly from the filter or water-distilling apparatus and then forcing it by a pump through coils of block tin pipe, imbedded in ice. The water thus cooled to a temperature of about 35° F is then passed through the carbonator as described, where it takes the gas. The theory is that the water and carbonic gas, having an affinity for each other, when cool, are mixed and mingled successfully at about the temperature stated, the gas being at a pressure of about 55 pounds to the square inch. Waters thus highly charged with carbon dioxide (CO_2) are naturally under

great pressure and present problems in filling. Such waters supply their own pressure entirely and flow continuously from the carbonator to the sipping, filling, and capping machine.

The present system of manufacturing carbon dioxide, contradistinguished from the generator plan, is that the gas is taken from various sources like marble dust and raw magnesite by heat or the burning of coal or coke, with the detention or catching of the gas in the flues or chimneys after the complete combustion. This gas is then taken and put through a series of pumps and cooled down to a very low temperature and liquified and forced into steel tubes, at a pressure of about 900 pounds to the square inch. This is a separate industry, the manufacturers selling the compressed gas to the bottlers.



MACHINE FOR FILLING SIPHONS

The present system of sipping, filling, bottling, and capping the bottle of carbonated beverage is what is known as the crown cap or single-service cork, the same as described for bottled beer, and is generally used throughout the United States. The foot-power soda-bottling machine, with a single operator, will siphon, fill, and cap about 350 half-pint bottles per hour, while the power-driven automatic machine will siphon, fill, and cap about 2000 half pints, or 1500 pints, or 1000 quart bottles per hour respectively. The system of bottling siphon waters, or artificial mineral waters, is to bottle the product in the regular siphon bottle, which is extra strong, and tested in advance of use. The ingredients or salts to make the different artificial mineral waters are first dissolved in the still water before the gas is added for saturation. Then, after the solution of the mineral

salts, to make them correspond to some natural mineral waters, the gas is added, and the system of drawing off and bottling is much like that above described for soda-water bottling or carbonated beverages.

In both soda-water bottling and siphon bottling the workmen usually, or should, wear masks, gloves, sleeves, and aprons of horsehide leather as a protection against flying glass from bursting bottles. In addition, the bottles are placed in strong iron cages or traps while being filled. Siphon bottles are filled upside down through the nozzle or head of the siphon. Mineral-water bottling is carried on in much the same way as soda-water bottling. Where it is bottled still, it is taken directly from the spring in pipes in a very simple manner and capped immediately; when it is charged with carbon dioxide, it is forced through a carbonator, where it takes the gas, and the bottling is done with the same kind of machine as is used for soda-water bottling, but the siruping part is omitted. Bottle-labeling machines, to affix labels to the bottle, body or neck, or both, are in general use. Power-driven labeling machines, operated with one attendant only, will label from about 2000 to 3000 bottles per hour.

Bibliography. Consult: Sulz, *Treatise on Beverages* (New York, 1888); Dreesbach, *Beer Bottler's Handy Book* (Chicago, 1906); Goosmann, *The Carbonic Acid Industry* (Chicago, 1906).

BOTTOM (AS. *botm*, Ger. *Boden*, Lat. *fundus*, ground, bottom). A term used to designate either the whole ship itself, or that part of it which is under water when laden. Commodities are often said to be imported "in foreign bottoms," or in "American bottoms," in which cases the phrase is applied to the whole ship. A "full ship," or a "full bottom," denotes such a form given to the lower half of the hull as to allow the stowage of a large amount of merchandise. A "sharp ship," or a "sharp bottom," implies a capacity for speed.

BOTTOM, Nick. In Shakespeare's *Midsummer Night's Dream*, an ignorant and conceited weaver. In the play of *Pyramus and Thisbe*, he takes the rôle of Pyramus. Puck gives him an ass's head, and Titania is compelled by the fairy king to be enamored of him.

BOTTOM HEAT. The heat communicated to certain soils from below, either by the fermentation of fresh stable manure, tan bark, leaves, etc., buried for the purpose, or by steam-pipes, flues, or other like arrangements. It is one of the most important agents used in forcing houses and hotbeds in the artificial cultivation of vegetables, flowers, or fruits.

BOTTOMRY BOND or CONTRACT (for derivation, see Bottom). An agreement for a definite period of time or for a voyage by the owner or master of a ship, pledging the ship or the ship and its cargo as security for the repayment of money loaned for the building, repair, or fitting of the ship or for the purposes of the voyage. When the cargo of a ship alone is pledged, the agreement is strictly called a *respondentia bond*. In either case the loan is made upon a maritime risk, i.e., upon the condition that the loan or debt, together with the stipulated interest, shall be repayable only on the safe termination of the voyage; otherwise the lender loses his debt. In consideration of the hazard, he may exact any rate of interest, not grossly extortionate, which the nature of

the adventure may justify. The agreement is usually in the form of a bond and must set forth all the necessary terms, especially the maritime risk. The owner may hypothecate the vessel or its freight and execute a bottomry bond at any time and for any purpose; but the master can do so only under stress of necessity in a foreign port, destitute of funds and unable to communicate with, or to receive instruction from, the owners.

Contrary to the rule governing ordinary mortgage securities, preference among bottomry bonds is not according to order of date, but inversely, the latest having priority, on the theory that the last loan saved the ship. The United States statute which provides for the recording in the office of the collector of the port, of bills of sale, mortgages, hypothecations, and conveyance of vessels, under penalty of their being otherwise invalid as against subsequent purchasers, mortgagees, or lien holders, expressly excepts the lien of a bottomry bond from its operation where such lien has been created by a loan of money or materials necessary to repair the vessel or to enable her to prosecute the voyage, so that the lien of that description does not lose its priority. A bottomry bond is, however, subordinated to the lien of the seamen for wages, even though in some cases given after the wages were earned, and to liens for repairs or supplies indispensable for the safety of the ship. Where the holder of a bottomry bond is compelled to satisfy a lien for wages, it seems that he is entitled to compensation from the owners and has a lien upon the proceeds of the ship for reimbursement. See ADMIRALTY LAW; MARITIME LAW, and the authorities there referred to.

BOTTOMRY. See Bottomry.

BOTTS, JOHN MINOR (1802-69). An American lawyer and politician, born in Virginia. He served several terms in the Virginia Legislature after 1833 and in 1839 was chosen to Congress, where he served three terms (1839-43 and 1847-49) and where he was conspicuous as an advocate of a protective tariff, of a national bank, and of the repeal of the gag rules (q.v.). When President Tyler left the party that elected him, Botts separated from and antagonized him, although a warm personal friend. He opposed secession and was faithful to the Union through the Civil War. He published *The Great Rebellion: Its Secret History, Rise, Progress, and Disastrous Failure* (1866).

BOTULISM. A term originally used to embrace all forms of sausage poisoning. It is really due to a specific saprophytic bacillus, *B. botulinus*. This organism is mostly found in incompletely cooked or cured ham and produces a soluble and very active toxin. The symptoms of botulism are those of severe gastroenteritis, followed by visual disturbances, extreme prostration and, in fatal cases, delirium or coma, and collapse. Other organisms occurring in diseased or decomposed meat, and giving rise to similar symptoms, are *B. enteritis*, *B. coli*, and *Proteus vulgaris*. The eating of putrid meat and fish is common in many countries and does not of itself cause poisoning. It is only when a specific bacillus happens to be present that toxic symptoms arise. See FROMAINES; SAUSAGE POISON.

BOTURINI BENADUCI, bo'too-ré'né bá'ná-doo-ché, LORENZO (c.1702-?). An Italian historian, and one of the first great collectors of American antiquities. He went to Mexico in

1736 and gathered a very large collection of aboriginal writings and other records, which eventually passed into the archives of the Mexican government, where most of them were lost or destroyed. Botuini returned to Spain and was appointed historiographer for the Indies in 1745. He included a valuable catalogue of his collections in his only published work, *Idea de una nueva historia de America* (1746).

BO TZARIS, bô-tsa'rês, MARCO See Boz-zaris, MARCO

BO TZEN See Bozen

BOUAYANAN, or **BUAYANAN**, bwi-ya'-nan A dialect group of the Batak of northern Palawan. They have intermarried to a considerable extent with neighboring Malay people. See PHILIPPINES

BOUCHAIN, bô'shân' (anciently, Lat *Lucinum*, the first part of the name was probably taken from Baudouin, or Baldwin IV, who fortified the town). A fortified town in the department of Nord, France, 12 miles southeast of Douai, situated on an eminence about 300 feet above the sea level (Map France, N, J 2). By means of two sluices the adjacent land may be laid under water in time of war. There are beet-root sugar refineries, dye works, and tanneries at Bouchain, which has also a considerable trade in cattle. Pop., 1896, 1527, 1901, 1760, 1911, 2214.

BOUCHARD, bô'shar', CHARLES JACQUES (1837-) A French physician, born in Montier-en-Der (Haute-Marne). He was educated in Lyons and subsequently went to Paris, where he was appointed professor of pathology in 1879. He was one of the physicians sent to the International Congress of the Medical Sciences, held in Berlin in August, 1890, and took a prominent part in the deliberations of that body. Among his principal works may be mentioned *Des dégénération secondaires de la moelle épinière* (1866), *Sur quelques points de la pathologie des hémorrhagies cérébrales* (1887), *De la pathologie des hémorrhagies* (1889), *Leçons sur les auto-intoxications* (1887, Eng. trans., 1906), *Antisepsie* (1889), *Traité de radiologie médicale* (1904).

BOUCHARDON, bô'shar'dôn', EDMOND (1698-1762) A French sculptor, born in Chaumont (Haute-Marne). He was a pupil of his father, Jean Baptiste Bouchardon, sculptor and architect, and afterward of the younger Coustou in Paris. Winning the *Prix de Rome* in 1722, he studied nine years in the Eternal City, where he executed a number of portrait busts, including that of Pope Clement XII. On his return to Paris he received quarters in the Louvre, in 1736 was named official designer of medals and memorial coins of the reign of Louis XV, and in 1746 professor in the Royal Academy. Among his principal works are "Christ Bearing the Cross" and "Cupid Cutting a Bow from Hercules' Club," in the Louvre, and several statues and a tomb in St Sulpice, Paris. His principal works for the city of Paris were the decorative fountain in the Rue du Grenville-St Germain and the bronze equestrian statue of Louis XV, destroyed during the Revolution—His brother, JACQUES PHILIPPE BOUCHARDON, was court painter to the King of Sweden and modeled a great number of figures for the Royal Palace at Stockholm.

BOUCHER, bô'shâ', ALFRED (1850-) A French sculptor, born in Bouy-sur-Orvin. He was a pupil of Dumont and Paul Dubois, and

in 1876 received the second *Prix de Rome*. In 1886 he received a gold medal for "Au But," a youth at the end of a race, now in the Luxembourg garden, in 1891, the medal of honor for "A la Terre," a youth spading the ground, now in the Musée Galliera, and in 1900 the *Grand Prix* of the Paris Exposition. Other important works by him are "Repose," a woman sleeping, in the Luxembourg Museum, and "Diana Surprised," in the Musée Galliera.

BOUCHER, FRANÇOIS (1703-70) One of the most important painters and decorators of the Rococo period in France. He was born in Paris, Sept. 29, 1703, studied painting with Lemonne, and was then apprenticed to the engraver François Jean Cars, but formed his style after Watteau (qv). In 1623 he won the *Grand Prix de Rome* and went to Italy in 1827. After a period of study in Rome and Venice, in which he was chiefly influenced by Tiepolo, he returned to Paris, where he speedily won a great reputation. He became a member of the Academy in 1734, professor in 1739, rector in 1761, and director in 1766, when he was also appointed first painter to the King. He was an artist of prodigious facility and indefatigable industry, was endowed with a brilliant imagination, and painted everything, from religious subjects and mythological and pastoral scenes to still life, from portraits, landscapes, and animals to decorations for the opera. His works are the true mirror of his time, when voluptuousness was the keynote of the court and aristocratic society. Pastoral scenes were his favorite subjects, painted with a spirited touch and a freshness and transparency of color resembling that of Rubens, but sensual in character. To the end of his days he was celebrated as the "Painter of the Graces," and was also styled the "Anacreon of Painting." He was in high favor with Madame de Pompadour, whose portrait he painted, and who engraved some of his works. An interesting phase of his art is found in his designs for the tapestry factory of Beauvais (1734-55), in which he changed the customary allegorical and hunting subjects to spirited pastoral scenes and fêtes galantes. This activity was continued as inspector of the Paris Gobelins from 1755 to 1765. Among his most celebrated paintings are "Rinaldo and Armida," "Diana Leaving the Bath," "Venus Demanding of Vulcan Arms for Æneas," "Jupiter and Callisto," "Rape of Europa"—all in the Louvre, "Leda and the Swan," "Triumph of Galatea," "Toilet of Venus," in the Stockholm Museum. He is represented in other large European and in most of the French provincial museums. Consult Mantz, *Boucher, Lemoyne and Natoire* (1880), the monographs of Goncourt (Paris, 1861, new ed., 1881), Watier (ib., 1885), Michel (ib., 1886, new ed., 1907), and Kahn (ib., 1905), also the extra number of the *Connoisseur* (London, 1908).

BOUCHER, bou'chër, JONATHAN (1738-1804) A British-American clergyman, prominent as a Loyalist at the time of the Revolutionary War. He was born in Blencogo, England, emigrated to America in 1764, conducted a boarding school in Virginia, was ordained a priest in 1762, and was a rector in Virginia and Maryland until 1775. He was then driven from his pulpit on account of his opposition to the principles of the Revolution, and returned to England, where from 1785 until his death he was vicar of Epsom. He wrote many essays and papers on political and theological subjects,

but is chiefly remembered for his *View of the Causes and Consequences of the American Revolution* (1797)—a collection of 15 discourses delivered in Virginia and Maryland between the years 1763 and 1775. Of this book Professor Tyler has said: "Nowhere else, probably, can be found so comprehensive, so able, and so authentic a presentation of the deeper principles and motives of the American Loyalists, particularly from the standpoint of a High-Church clergyman of great purity and steadfastness of character, of great moral courage, of great learning, finally of great love for the country thus torn and distracted by fratricidal disagreements." The book was dedicated to Washington, between whom and Boucher there existed for many years an intimate friendship. A *Glossary of Archaic and Provincial Words*, an unfinished work, was used as a supplement to *Webster's Dictionary* in 1832-33. Extracts from Boucher's *Autobiography* were published in *Notes and Queries*, 5th series, vol. vi (1850), and the "Letters of Jonathan Boucher to George Washington," in the *New England Historical and Genealogical Register*, vol. lii (Boston, 1898). Consult Tyler, *Literary History of the American Revolution* (New York, 1897).

BOUCHER, bō'shā', PIERRE, SIEUR DE BUCHERVILLE (1622-1717). A French pioneer, who came to America in 1635 and was engaged in the wars with the Iroquois. He was sent by the Colony of New France as deputy to France in 1661, about which time he published his *Histoire véritable et naturelle des mœurs et des productions de la Nouvelle France* (1663). He was ennobled and appointed Governor of Three Rivers. Shortly before his death he addressed to his children *Les adieux du grandpère Boucher*.

BOUCHER DE CRÈVECŒUR DE PERTHES, de krēv'kēr' de pārt', JACQUES (1788-1868). A French archaeologist, born at Rethel. He was employed by Napoleon in several diplomatic missions to Italy, Germany, and Austria, and after the Restoration was most active as president of the Society of Emulation at Abbeville. He collected Roman and Celtic antiquities, which he presented to the government, and gained much celebrity by archaeological discoveries and by his work *De la création* (1839-41). Even more noteworthy are *Antiquités celtiques et antédiluviennes* (1847-65) and *De l'homme antédiluvien et de ses œuvres* (1860); in the former of these he first proved that man had existed in the Pleistocene Period. His views on this point were not accepted till they were approved by Prestwich (q.v.). Consult "Recollections of M. Boucher de Perthes," in Lady Prestwich's *Essays Descriptive and Biographical* (London, 1901).

BOUCHER-DESNOYERS, bō'shā'dā'nwā'yā', AUGUSTE GASPARD LOUIS, BARON. See DESNOYERS, AUGUSTE GASPARD LOUIS BOUCHER, BARON.

BOUCHES-DU-RHÔNE, bō'sh' dū-rōn' (Fr. Mouths of the Rhône). A department in the southeast of France, bordering on the Mediterranean, formerly a part of Provence (Map: France, S., K 5). Area, 2026 square miles. Pop., 1806, 679,646; 1901, 734,347; 1911, 805,532. About one-half of the department is under cultivation; heaths, woods, wastes, and water occupy the other half. The Rhône—which between Arles and the sea separates into several branches, forming a delta called *île de la Ca-*

margue—and its affluent, the Durance, are the principal rivers. The department is intersected by several canals of importance. The agricultural products are cereals, olives, grapes, vegetables, and in some parts sheep; while the cultivation of figs, capers, mulberry trees, and silkworms receives the most attention. The most important mineral product is lignite, but iron, bauxite, lime, building stone, cement, and marble are also obtained. More salt is produced than in any other department in France, and metal founding, distilling of oil, shipbuilding, and soap making are quite general throughout the territory. Capital, Marseilles.

BOUCHETTE, JOSEPH, bō'shet' (1774-1841). A French-Canadian engineer, topographer, sailor, soldier, and scout. He received his professional training in the office of his uncle, then surveyor-general of British North America. In 1794 he raised the sunken gunboat *Anondaga* in Toronto harbor and sailed her to Niagara. For some time he was employed in making surveys of the harbors of Lake Ontario, and in 1803 he succeeded his uncle, Major Holland, in the surveyor-generalship of Lower Canada. He did valuable scouting on the Canadian side in the War of 1812-15. Appointed on behalf of Great Britain to take part in the survey of the boundary between British America and the United States, he did his share of the work between New Brunswick and Maine in 1817, but was prevented by illness from continuing it along the forty-fifth parallel in the following year. With extraordinary industry and intelligence he persisted in collecting a mass of topographical information which he published in England in 1830. His great work was dedicated to William IV, but he served also as a public official under George III, George IV, and Queen Victoria. His death took place in Montreal.

BOUCICAULT, bō's'ak-ō, DION (1822-90). An Irish-American playwright and actor, born in Dublin, of an Irish mother and a French father, Dec. 26, 1822. He was brought up under the guardianship of Dr. Dionysius Lardner, after whom he was named, and was educated at University College, London. His first dramatic work, produced before he was 19 years old, was *London Assurance*, Covent Garden, in March, 1841. Its signal success determined his career. It has ever since remained a favorite with British and American playgoers. The plot was slight, but ingenious; it abounded in comic situations; the dialogue was brisk and sprightly; there was no lack of wit, and there were perhaps more than enough of those flippancies and pleasant impertinences which average theatregoers prefer to wit. Boucicault next produced, in rapid succession, *Old Heads and Young Hearts*, *Love in a Maze*, *Used Up*, *Louis XI*, and *The Corsican Brothers*. When he went upon the stage, in 1852, he added the vogue of an actor to the reputation he had previously gained as an author. From 1853 till 1860 he was in America, where his popularity was scarcely less than it had been in England. On his return to London in 1860, he produced at the Adelphi Theatre a play, *The Colleen Bawn*, which proved among the most successful of modern times, and which, if not the first of a new school, has at least supplied a new descriptive name to our dramatic literature. The author made a fortune by it. It has been performed in almost every theatre in the United Kingdom; it had a great run in

America, it was even translated into French, and brought out at the Ambigu Theatre in Paris. Boucicault subsequently produced at the Adelphi — of which he was for some time joint manager — another "sensational" drama, *The Octoroon*, the popularity of which was only a little less than that of *The Colleen Bawn*. In 1862 he opened a new theatre in London, the Westminster, but this speculation turned out unfortunately. He afterward reestablished his fortunes by new plays, in some of which he and his wife — formerly Miss Robertson, a very popular actress — took the leading parts. *The Streets of London*, *Flying Scud*, *After Dark*, and *The Shaughraun* were among the most popular of his later works, all of which are of the type with which he had familiarized the public. His character of Con in *The Shaughraun* was perhaps his most effective and amusing creation. In collaboration with Charles Reade he wrote the novel *Foul Play*, which was afterward dramatized. In all he wrote more than 300 dramatic pieces, and in illustration of the facility with which he composed works which — all deductions made — are of considerable merit, it may be said that he once even wrote to a royal commission that he would undertake to write plays for all the theatres in London. As an actor, Boucicault was always very popular, without attaining high excellence in his vocation. His lack of marked histrionic talent was, in part at least, made up by his keen sense of humor, and whatever his artistic ability may have been, it is certain that he was immensely popular with his audiences. In 1876 he took up his residence in New York, where he died, Sept. 18, 1890. He was twice married. Three of his six children Dion (1861), Nina (1867), and Aubrey (1869), also became distinguished in the profession. Consult Clement Scott, *The Drama of Yesterday and To-day* (London, 1899); Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906); Winter, *Other Days* (New York, 1908).

BOUCICAULT, Mrs. DION (1833–) An English actress, the adopted daughter of Charles Kean. As Agnes Robertson she had already made a reputation in Taylor's *Our Clerks* and other comedies at the Princess's Theatre, London, when, in 1853, she became the wife of Dion Boucicault (q.v.) and accompanied him to America. Returning in 1860 to London, she played successively at the Adelphi, Drury Lane, and other theatres, taking leading parts in several of her husband's dramas, notably as Eily O'Connor in *The Colleen Bawn* (1860), Zoe in *The Octoroon* (1861), and Jane Learoyd in *The Long Strike* (1886). For a time she again lived in America, but in her later life was separated from her husband.

BOUDICCA. See **BOADICEA**.

BOUDINOT, bōō'din-ōt, ELIAS (1740–1821). An American philanthropist, born in Philadelphia, Pa. He studied law, was admitted to the New Jersey bar, and was in 1777 appointed by Congress commissary general of prisoners. In 1777–78 and again in 1781–84, he was delegate from New Jersey to the Continental Congress, of which he was in 1782 elected President. In the latter capacity he signed the ratification of the definitive Treaty of Peace with Great Britain. In 1789–95 he was a member of the First, Second, and Third Congresses of the United States, and from 1795 to 1805 was Director of the Mint at Philadelphia. He assisted in 1816 in founding the American Bible Society, whose

first president he became. He aided also in the education of Indians and deaf-mutes, in the relief of the condition of the poor, and in the preparation of youth for the ministry. His publications include *The Age of Revelation* (1790), a reply to Thomas Paine's *Age of Reason*, and *Stas in the West*. or, *An Attempt to Discover the Long Lost Tribes of Israel* (1816), in which, with an extensive array of evidence, he supports the theory of James Adair, that the North American Indians are the lost tribes in question. Consult Boudinot, *Life of Elias Boudinot* (1896).

BOUDINOT, ELIAS (?–1839). The name taken, with Dr. Boudinot's permission, by a Cherokee Indian in the missionary school at Cornwall, Conn., where he married a white lady of the village. *An Address to the Whites* on behalf of his nation, delivered May 25, 1825, in Philadelphia, was published in 1826. He edited the *Cherokee Phoenix* (1828–34), and was a man of talent and influence in his nation. Being, with others, persuaded to make a treaty with the United States in December, 1835, for the expatriation of the Cherokees, he was accused of having sold his country, and was killed by the John Ross party, June 10, west of the Mississippi. — His son, ELIAS CORNELIUS BOUDINOT (1835–90), was educated in New England and became a well-known lawyer, a lieutenant colonel in the Confederate army, and a delegate from his nation to the Second and Third Confederate Congresses.

BOUFFARIK, bōō'fa-rēk' (the 'Hanging Well'). A town in the department of Algiers, Algeria, 21 miles by rail southwest of the town of Algiers. Originally it was called Medina Clausel, after Marshal Clausel, who planted the town on the site of an entrenched camp in 1835. It is the centre of a rich agricultural district on the plain of Mitidja, growing oranges, grapes, and grain. Pop. 1901, 9284, 1911, 10,968.

BOUFFIERS, bōō'fiar', LOUIS FRANÇOIS, Duc DE (1644–1711). A marshal of France. He was descended from one of the oldest noble families of Picardy. He began his military career as a lieutenant and rose very rapidly in rank. Under the great Conde, Turenne, Crequi, Luxembourg, and Catinaut, he fought with distinction in Germany, the Netherlands, and on the Spanish frontiers. His defenses of Namur in 1695 and of Lille in 1708 are famous. The siege of the former place, conducted by William III, cost the Allies more than 20,000 men, and although Louis XIV sent to Bouffiers an order written by his own hand for the surrender of the place, he did not surrender it until all the means of defense were exhausted. After the defeat of Malplaquet (Sept. 11, 1709), he led the French army so admirably that the retreat seemed rather a triumph than the result of a lost battle. He was a man of highly honorable and upright character. Consult La Rue, *Oraison funèbre* (Paris, 1712).

BOUFFIERS, STANISLAS, MARQUIS DE (1738–1815). A French wit and author, commonly styled the Chevalier de Bouffiers. He was born in Nancy and trained for the Church, but, dissatisfied with the clerical profession, the young abbe entered the military service of France and was made Governor of Senegal in 1765. He was a member of the Constituent Assembly in 1789. He emigrated in 1792 and was well received at the court of Frederick William II of Prussia. Returning to France in 1800, he resumed his old place of academician, and continued a devoted

adherent of light literature till his death, in January, 1815. His poems are typical of the age, charming, meaningless, but full of passion. He was a brilliant conversationalist and a fine wit; a friend of Voltaire's, a romancer, and a *débauché* after a gentlemanly fashion. His best-known work is the story *Aline, reine de Golconde*. A collection of his works was published after his death (8 vols., Paris, 1815). Consult Uzanne, *Notice sur la vie de Boufflers* (Paris, 1880), and his *Lettres de Boufflers*, published in Paris in 1875.

BOUGAINVILLE, boo'gān'vel' (after the navigator Bougainville). The largest of the Solomon Islands (qv) under German control in the Pacific, situated in about lat. 6° S. and long. 155° E. (Map: Australasia, H 3). Area, 3860 square miles. It is well wooded, densely populated, and contains two active volcanoes, one of which, Mount Balbi, rises to a height of over 10,000 feet. Bougainville Strait separates it from Choiseul Island on the southeast. The name "Bougainville" is also applied to a strait in the New Hebrides group between the island of Marina and Mallicolo, a cape on the northwest coast of Australia, and a cape on the south coast of New Ireland. Pop., about 60,000.

BOUGAINVILLE, Louis Antoine de (1729-1811). A French soldier and navigator, born in Paris. He studied law, was admitted as an advocate before the Parlement, and published a *Traité du calcul intégral* (2 vols., 1754-56). Having subsequently entered the army, he was in 1756 appointed aid-de-camp to the Marquis de Montcalm in Canada. He presented the terms of capitulation at the fall of Oswego (1756), was dispatched to Montreal with news of the victory at Fort William Henry (1758), and was slightly wounded at the capture of Ticonderoga (1758). In the autumn of 1758 he went with Doreil to France to request supplies and reinforcements. During the siege of Quebec (1759) he was stationed with 1500 troops at Cap Rouge, there to watch the movements of the English squadron under Admiral Holmes. With the rank of colonel he left the army in 1763, entered the navy, and was authorized by the government to establish a French colony in the Falkland Islands (Îles Malouines). In 1766-69 he circumnavigated the globe. Through the scientific and geographical discoveries of this voyage he won for the nation a glory not unlike that obtained by Cook for England in a similar expedition. When, in 1778, France came to the assistance of the United States in the Revolutionary War, he was appointed to the command of a ship of the line, took a distinguished part in the battle between De Grasse and Admiral Rodney, and rose to the rank of *chef d'escadre*. He subsequently reentered the army as a brigadier general, but retired in 1790, and later became a Senator and Count of the Empire. The *Journal* kept by him during his service in Canada is highly praised by the historian Parkman; he also wrote *Voyage autour du monde* (2 vols., 1771-72). Consult Parkman, *Montcalm and Wolfe* (Boston, 1884).

BOUGAINVILLEA, (named for De Bougainville, a French navigator). A genus of plants belonging to the family Nyctaginaceæ. There are seven or eight species, all of them South American. They are shrubs, sometimes trailing, with small inconspicuous tubular flowers surrounded by large colored bracts. Some of the species have been widely introduced in the

tropics and warmer parts of temperate zones and are often conspicuous about dwellings. *Bougainvillea spectabilis* is probably the best-known species. It is a tall growing shrub, often used to cover trellises, and is very handsome on account of its large clusters of flowers with their deep rose-colored bracts, varying to purple or greenish. *Bougainvillea glabra* is a smaller plant, with rosy-red bracts. A variety, *sanderiana*, is often grown in pots. It blooms profusely, is of brighter color, and is considered a valuable plant for greenhouse culture, as it begins blooming very soon after starting growth and continues in flower for a long time.

BOUGHT AND SOLD NOTES. The written memorandum of a transaction of purchase and sale of personal property which is delivered to the buyer and seller, respectively, by the broker who conducted the sale. The copy delivered to the seller is the sold note; that delivered to the buyer is called the bought note. The object of the notes is to inform the buyer and seller of the fact and of the terms of the contract, and also, where necessary, to satisfy the requirements of the Statute of Frauds (qv.). No particular form of words is necessary to a valid bought or sold note. The usual form of a sold note is the following: "Sold for A B to C D 1000 bushels of Early Rose potatoes, now in A B's cellar, for \$300 cash, to be paid on delivery at C D's warehouse, within one week from date." Dated, and signed by the broker. The bought note would begin, "Bought from A B for C D," but otherwise it would contain the same language as the sold note. Bought and sold notes have been the subject of considerable litigation in England. For the legal rules deducible from the English decisions relating to them, see Benjamin, *Treatise on the Law of Sale of Personal Property* (7th Amer. ed., by Bennett, Jersey City, 1889), and Campbell, *Law Relating to the Sale of Goods and Commercial Agency* (2d ed., London, 1891).

BOUGHTON, bo'ton, GEORGE HENRY (1833-1905). A genre and landscape painter who may be classed in both the American and British schools. He was born near Norwich, Dec. 4, 1833. His family came to America when he was a child and settled at Albany, where he received his first instruction in art. His earliest paintings proved so successful that in 1856 he was able to make a sketching tour through England, Scotland, and Wales. He had a studio in New York from 1858 to 1860, when he went to Paris. For two years he studied there, visiting no regular school but receiving much assistance from Edouard Frère. After 1862 he resided in London. He continued, however, to exhibit in the United States and always found patrons here. His subjects also were for the most part from the life of the early American colonists and that of Holland. He was elected to the National Academy of Design in 1871 and to the Royal Academy in 1896. His work is marked by grace and refinement, by a fine sense of color, and by much sympathy with nature. Among his principal paintings are "Winter Twilight" (1858); "Puritans Going to Church" (Public Library, New York, 1867); "The Heir-Presumptive" (1873); "The Edict of William the Testy" (1877, Corcoran Gallery, Washington); "Snow in Spring" (1877); "Hester Prynne," from *The Scarlet Letter* (1881); "Weeding the Garden" (1882, National Gallery, London); "Golden Afternoon" (1888, Metropolitan Museum, New

York), "The Road to Camelot" (1898), "Strome Valley" (1904). He also wrote for the magazines and illustrated his stories with taste and skill. Consult A. L. Baldry, *G. H. Boughton: His Life and Work* (London, 1904).

BOUGIE, bō'zhē', or **BOUGIAH**, bōo-jā (from the tribe *Bujayah* or *Bojana*). A fortified Mediterranean seaport on the Bay of Bougie, in the department of Constantine, Algeria, 112 miles east of Algiers. It has a deep and well-sheltered roadstead, and an inner basin with quayage (Map Africa, E 1). It has a trade in grain, wine, oranges, oil, minerals, and wax, the latter being famous, due to the fact that wax candles are said to have been first made here, thus giving the derivation to the French name "bougie," of that article. The town is built on the slope of Mount Guraya, which rises to a height of 2310 feet. The chief buildings are the Abd el-Kader fort, used as a prison, and the French church. Founded by the Carthaginians, it was the Roman *Saldae*, and Genseric, King of the Vandals, who for a time made it his capital, built walls around it. In the tenth century it was the greatest commercial city of the north African coast, with a population of 100,000, and in the twelfth and thirteenth centuries Italian merchants had their own warehouses and churches there. After the successive occupation by Spain and Turkey, in the sixteenth century, it dwindled into insignificance. Its modern rise dates from the French occupation in 1833. Pop., 1901, 14,552, 1911, 19,012.

BOUGIE, bōo-zhē' (Fr. wax candle, a bougie, from the Algerian town Bougie, whence these candles were first imported). A solid rod of whalebone, gutta-percha, woven thread covered with gum elastic or other substances, used for distending contracted mucous canals, as the gullet, bowels, or urethra. (See *STRUTURES*.) Similar instruments made of silver, steel, or other metals are called "sounds." Bougies vary from a filiform to a half inch in diameter. They are cylindrical, tapering to a blunt point, or tipped with olive-pointed or conical extremities. The name is also given to rods of gelatin or cocoa butter, impregnated with drugs, which are placed in the urethra to be dissolved by degrees, as the heat of the body melts them, thus causing a continuous application of the medicine. Special medicated bougies are also made for the nasal cavities.

BOUGIVAL, bōo-zhé'val'. A favorite pleasure resort of Parisians in the department of Seine-et-Oise, France, on the left bank of the Seine, 8 miles northwest of Paris (Map Paris and vicinity). Its Romanesque church dates from the twelfth century. Pop., 1901, 2189, 1911, 2671.

BOUGUER, bōo-gā', **Pierre** (1698-1758). A French mathematician and physicist, the founder of photometry. He was born at Croisic, in Bretagne, and studied in the Jesuit College at Vannes. In 1713 he succeeded his father as professor of hydrography in Croisic, whence he removed to a similar office in Havre in 1730. In 1729 he published his *Essai d'optique sur la graduation de la lumière*. In 1731 he was made associate geometer of the Academy of Sciences and was promoted to the office of pensioned astronomer in 1735. He was chosen to proceed, along with Godin, La Condamine, and Jussieu, to South America, for the purpose of measuring a degree of the meridian at the equator. They had to contend with many difficulties, and were

more than seven years away from home, during which time Bouguer made valuable observations on the length of the seconds pendulum at great elevations, the deviation of the plumb line from a vertical position through the attraction of neighboring mountains, the line of perpetual snow, etc. He published an account of his labors and those of his colleagues in a magnificent work, entitled *Théorie de la figure de la terre* (1749). Bouguer's investigations concerning the intensity of light laid the foundation of photometry, and their results, which had been partly exhibited in the optical work already noticed, were more fully embodied in his *Traité d'optique sur la graduation de la lumière*, which was edited after his death by Lacaille (1760). He is the inventor of the heliometer (qv). He published an excellent *Nouveau traité de navigation et de pilotage* (1753), and numerous works in the *Mémoires de l'Académie des Sciences* (1726 to 1757).

BOUGUEREAU, bōo-grā', **ADOLPHE WILLIAM** (1825-1905). A French figure painter. He studied under Picot, took the *Prix de Rome* in 1850, received medals of honor in 1873 and 1885, became a member of the Institute in 1876 and grand officer of the Legion of Honor in 1903. A classicist in line and contour, he was also influenced by modern realism, especially in rendering flesh. Although his work is very popular with the general public, it is less so with artists and critics, who consider it lacking in sincerity and untrue to nature. The figures are idealized models, and his execution is very smooth and labored. Of his paintings, which are numerous in the provincial and metropolitan museums of France, the most celebrated are "The Body of St. Cecilia Borne to the Catacombs" (1898), "The Birth of Venus" (1879), and "La Vieille Consolatrice" (1877)—all in the Luxembourg. He was formerly very popular in the United States, where he is well represented in public and private collections. He also painted mural decorations in Ste. Clotilde and St. Augustin, Paris, in the Opéra at Bordeaux, and elsewhere. Consult the catalogue of his works by Vendryes (Paris, 1885), and Ménard in *The Portfolio* (London, 1875), also the monographs by Ménard (Paris, 1885) and Vachon (ib., 1900).

BOUILLÉ, bōo-yā', **FRANÇOIS CLAUDE AMOUR, MARQUIS DE** (1739-1800). A French general. He was born at the castle of Chuzel, in Auvergne, entered the army at the age of 14, and served with distinction in Germany during the Seven Years' War. He was Governor of Guadeloupe in 1761, and soon after became Governor-General of Martinique and St. Lucia, and commander in chief of the French forces in the West Indies. In the war against England which broke out in 1778 he added several small islands to the West Indian possessions of France. For this he was rewarded with the rank of lieutenant general. In 1784 he visited England and was received with extraordinary respect on account of his kindly behavior to his enemies during the war just concluded. Louis XVI. nominated him a member of the Assembly of Notables in 1787-88, in 1790 he was made commander in chief of the Army of the Meuse, the Saar, and the Moselle. His decision of character prevented the dissolution of the army and the outbreak of civil war. He quelled the insurrection of the garrison of Metz and of the three regiments at Nancy. For this

he received the thanks of the National Assembly and of the King. From 1789 to 1791 Bouillé was regarded with suspicion by the Revolutionists, and rumors were often spread of his joining with the Austrians to march on Paris. After Louis XVI's flight to Varennes, of which he declared himself the instigator, he repaired to Coblenz to the King's brothers and in 1791 attended the conference at Pilnitz. In the same year he entered the service of Gustavus III of Sweden and after the assassination of that monarch served in the corps of the Prince of Condé. He rejected an offer, which the French princes made to him in 1793, of the chief command in La Vendée, and went to England, where his advice in West Indian affairs was useful to the government; here he wrote his *Mémoires sur la révolution française*, a useful work throwing much light on the transactions of that time. He died in London. Consult Gabriel, *Louis XVI, le marquis de Bouillé et Varennes* (Paris, 1874).

BOUILLIER, בּוּיִ'יָא', FRANCISQUE (1813-99). A French philosopher, born in Lyons. He studied at the Normal School, Paris, and in 1839 was appointed professor of philosophy at the University of Lyons. From 1849 to 1864 he was dean of the faculty of Lyons and from 1867 to 1870 director of the Normal School. His works, the best of which display both a finished style and high scholarship, include *Histoire et critique de la révolution cartésienne* (1842); *Théorie de la raison impersonnelle* (1844); *Le principe vital et l'âme pensante* (2d ed., 1873); *La vraie conscience* (1882); *Du plaisir et de la douleur* (4th ed., 1891); *Souvenirs d'un vieil universitaire* (1897); Latreille, *Francisque Bouillier, le dernier des Cartésiens* (Paris, 1907).

BOUILLON, בּוּיִ'לֹן' (ML. *Bullonium*). An old duchy, included in the Belgian province of Luxembourg, consisting of a woody and hilly district in the Ardennes, about 157 square miles in extent, with a population of 22,000. This duchy was the possession of the famous Crusader Godfrey de Bouillon (q.v.), who, in order to raise money for his Crusade, pledged it in 1095 to the Bishop of Liège, from whom it passed to the Lords of Sedan. In the seventeenth century it became the possession, under French suzerainty, of the family of La Tour d'Auvergne. In 1793 it became a part of France. After the Napoleonic wars it belonged for a time to the King of the Netherlands, and in 1830 it was united with Belgium. The little town of Bouillon, above which towers the mediæval castle of the dukes of Bouillon, is situated about 10 miles northeast of Sedan. Consult Ozeray, *Histoire de Bouillon* (Luxembourg, 1827).

BOUILLON, FRÉDÉRIC MAURICE DE LA TOUR D'AUVERGNE, DUC DE (1605-52). A French general, son of Henri. He first served in Holland under Maurice of Nassau, his uncle, and entered the French service in 1635. Joining the rebellion of the Comte de Soissons against Richelieu in 1641, he defeated the royal forces at La Marfée, but, abandoned by the Spaniards, retreated to Sedan and managed to make his peace with Richelieu, whereupon he received command of the French army in Italy. Implicated in the plot of Cinq-Mars only a year afterward, he was arrested and was in danger of execution, but his wife had possession of Sedan and threatened to surrender the place to the Spaniards

unless he should be saved. After the death of Louis XIII he went to Rome, where he had command of the papal forces. Returning to France in 1649, he took an active part in the war of the Fronde against Cardinal Mazarin. His *Mémoires* were published in 1731.

BOUILLON, GODFREY DE. See GODFREY DE BOUILLON.

BOUILLON, HENRI DE LA TOUR D'AUVERGNE, DUC DE (1555-1623). A French general, at first known as Vicomte de Turenne. He became a Calvinist and partisan of Henry of Navarre, who, when King, gave him the hand and estate of Charlotte de La Marek, the heiress of the Duchy of Bouillon. On the night in which he was to be married he suddenly left his prospective bride and stormed the fortress of Stenay, then held by the army of Lorraine. Soon afterward he was made marshal of France, and intrusted with two diplomatic missions to England, Holland, and Germany. Compromised in the Biron conspiracy, he was obliged to take refuge in Geneva in 1603, but became reconciled to the King in 1606. After the assassination of Henry IV he was one of the Council of the Regency and was alternately for and against the Queen. The Assembly of La Rochelle appointed him general in chief of the Reformed forces, but he refused the appointment and retired to Sedan, where he established a college and valuable library. His second wife, a daughter of William, Prince of Orange, left him two sons, the younger of whom was the celebrated Marshal Turenne. Consult his life by Marsollier (3 vols., Paris, 1720), and his *Mémoires* (Paris, 1666; new ed., 1901).

BOUILLY, בּוּיִ'יָא', JEAN NICOLAS (1763-1842). A French dramatist. During the Revolutionary period he was first a judge, then a public prosecutor in Tours, and later he was called to Paris to aid in the establishment of primary schools throughout France. He retired from public life in 1799. The sentimental character of most of his works earned for him the name of "poète lacrymal." The most noteworthy among them are: *Pierre le Grand* (1790), a comic opera, for which Grétry wrote the music; *L'abbé de l'épée* (1800); *Les deux journées*, set to music by Cherubini; *Fanchon*; and *Madame de Sévigné*. Of his writings for the young, the *Conseils à ma fille* (1809); *Contes offerts aux enfants de France* (1824); *Les adieux du vieux conteur* (1835), and *Contes à ma fille*, have passed through several editions and have been translated into several languages.

BOULAINVILLIERS, בּוּלֵ'אן'בֵּי'יָא', HENRI, COMTE DE (1658-1722). A French historian, born at Saint-Saire, Normandy. He studied for a time and entered the military profession. The difficulties of succession after the death of his father compelled him to study the titles of his family, and in the end he devoted himself exclusively to the investigation of the genealogy of the ancient families of France. He regarded the feudal system as the most perfect form of human government, and he succeeded so far as concerned himself in establishing absolute proof that all powers of government should be vested in certain families and particularly in his own. His writings, published after his death, include: *Histoire de l'ancien gouvernement de France* (1727); *L'état de la France* (1727); *Histoire de la pairie de France et du parlement de Paris* (1753); *Histoire des Arabes* (1731); and his *Abrégé*

chronologique de l'histoire de France (3 vols., 1733)

BOULANGER, bō'lan'zhā', GEORGES ERNEST JEAN MARIE (1837-91) A French general. He was born at Rennes, and educated at Saint-Cyr. He served in Italy and China, was with Bazaine at Metz, but escaped to Paris, and held a lieutenant colonelcy under the Government of National Defense. In 1881 he headed the deputation of French officers at the celebration of the centenary of the battle of Yorktown, he became brigadier general through the influence of the Duc d'Aumale, and in 1884-85 commanded the army of occupation in Tunis, but was recalled shortly after, owing to differences with the civil authorities. He was Minister of War from January, 1886, to May, 1887, and through the introduction of some desirable army reforms, and the appearance of a popular music-hall song in his praise, was adopted as the embodiment of the "revenge" policy by the Parisians. In 1887, while commanding an army corps, he was arrested for remarks on the acting War Minister, and in March, 1888, for disobedience to orders, was deprived of his command and placed on the retired list. Supported by a combination of malcontents of all parties, chief among them the Orleansists, he aroused for a time that reckless popular enthusiasm which is so easily stirred in France by a little bravado. For a brief period the "man on horseback" fixed the attention of all observers and aroused some fear as to the safety of the Republic. In 1888 and 1889 he was elected deputy from a number of departments. A coup d'état was momentarily expected, but Boulanger's courage was not equal to his ambition. When the danger of prosecution by the Tirard ministry for conspiracy seemed imminent, he fled to Brussels. He was convicted of malfeasance by the Senate. Politically discredited, he finally took up his residence in the island of Jersey. In 1890 one of his former adherents, M. Meunier, published in the Paris *Figaro* a series of revelations concerning the inner history of the Boulangist movement, under the title *Les coulisses de Boulangerisme*, furnishing conclusive evidence that Boulanger was a tool in the hands of the Royalists. The funds, amounting to 3,000,000 francs, for his propaganda were furnished by a Royalist noblewoman, the Duchesse d'Uzès. Boulanger committed suicide at Brussels, Sept. 30, 1891, on the grave of Madame Bonnemain, his mistress. Consult pamphlets and broadsides of the time, articles in the periodical press, and the following Chincholle, *Le Général Boulanger* (Paris, 1889), Guyot, *Le Boulangerisme* (Paris, 1889), Turner, *General Boulanger A Biography* (London, 1889), Verly, *Le Général Boulanger et la conspiration monarchique* (Paris, 1893), De Vermont, *Les coulisses de Boulangerisme revues et augmentées de plusieurs chapitres inédits* (Paris, 1890).

BOULANGER, GUSTAVE CLARENCE RODOLPHE (1824-88) A French figure painter. He was born at Paris, studied with Delaroche and Jollivet, and in 1849 took the *Prix de Rome*. Like Gérôme, whose art he resembles, he belonged to the Neo-Greek group of classicists and also painted Oriental subjects. Although his many classical paintings show deep archaeological study, his Oriental work is the better. All his paintings show a refined taste and imagination, but are cold and academic in execution. They include a "Moorish Café" (1848), "Cæsar at

the Rubicon" (1865), the "Promenade in the Street of Tombs, Pompeii" (1869), the "Slave-Market" (1883), and the decorative panels of the *foyer de la danse* of the New Opéra, Paris, with 20 portraits of dancers. The recipient of many medals, he became a member of the Institute in 1882.

BOULANGER, LOUIS (1806-67) A French painter, born at Vercelli (Piedmont). He was a pupil of Guillon-Lethière and Déveria, and from 1860 was director of the School of Fine Arts at Dijon. He first attracted attention in 1827 with his "Mazeppa" (Rouen Museum). His other works include "Spanish Mule-Drivers" (1833), many excellent water colors, chiefly in series depicting scenes from *Notre Dame de Paris*, *Othello*, *King Lear*, "The Triumph of Petarch" (1836), "Macbeth" (1859), "Concert in Picardy" (1866). He illustrated many of Hugo's works.

BOULAY DE LA MEURTHE, bō'lay' də la mērt', ANTOINE JACQUES CLAUDE JOSEPH, COUNT (1761-1840) A French statesman, born at Chaumousey in the Vosges, the son of a peasant. He espoused the cause of the Revolution, but held moderate views, and in the Council of Five Hundred opposed both Jacobinism and the despotism of the Directory. Under the Empire he took an important part in the preparation of the *Code Civil* and afterward labored with zeal in the administration of the national domains. Napoleon created him Count in 1813. After the Second Restoration he was banished to Nancy, whence the Russians carried him off into Germany. He was kept under surveillance at Halberstadt, and then at Frankfort until 1819, when he returned to France and lived in retirement at Paris. His *Essai sur les causes qui en 1649 amenèrent en Angleterre l'établissement de la république* (1799) had a wide circulation and considerably influenced the French mind in favor of the coup d'état of the 18th Brumaire. Of his other numerous political writings the most important is *Tableau politique les régnes de Charles II et de Jacques II* (2 vols., 1818). In conjunction with others he wrote *Bourienne et ses erreurs volontaires et involontaires* (1830), valuable regarding the history of Napoleon.

BOULAY DE LA MEURTHE, HENRI (1797-1858) A French statesman, son of Antoine (see above), born in Paris. He took an active part in the Revolution of 1830, but became an opponent of the government of Louis Philippe. He devoted great attention to questions of social economy, contributing much to promote the establishment of houses of refuge (*salles d'asile*), the extension of elementary education, and many improvements in the condition of the laboring classes. In the National Assembly of 1848 he associated himself with the moderate Republicans, and in January, 1849, was elected Vice President of the Republic. Nevertheless he tacitly acquiesced in the coup d'état of December, 1851, and became a member of the new Senate.

BOULDER, bō'ldər. A city and the county seat of Boulder Co., Col., 29 miles northwest of Denver, on the Union Pacific, the Colorado and Southern, and the Denver, Boulder, and Western railroads (Map Colorado, D 1). It is the seat of the State University, established in 1877, of Mt St Gertrude's Academy, and of the Colorado Chautauqua, and has a Carnegie library and one business college. There is a public

park of 2250 acres, and near by are the famous Boulder Cañon, and the gold, silver, and telluride mines of Sunshine, Salina, Gold Hill, Magnolia, Rowena, Springdale, Eldora, Ward, Sunset, Crisman, and Jamestown. Boulder is noted as a summer and health resort, medicinal springs being near, and a sanitarium in the city. It is in an agricultural, stock-raising, and mining region, and has flour mills, sampling works, lumber mills, cutlery and food-product factories, and manufactories of clay and kaolin products. A large number of oil wells have been drilled within a radius of two miles of the city. Chartered as a city in 1871, Boulder is now governed under a charter of 1882, which provides for a mayor, elected biennially, and a city council. The water works are owned and operated by the municipality. Pop., 1910, 9539.

BOULDER (origin obscure, usually compared with Sw. *bullersten*, a large rolling stone, so called from the noise with which it rolls, from *bullaa*, to thunder, roar), **ERRATIC**. A large mass of rock of rounded form found at a distance from the formation to which it belongs and lying detached on the surface or imbedded in the superficial deposits. Boulders originate, chiefly, either in corrosion by torrential waters or in erosion with solution along joint planes of rock and owe their present distribution to torrential waters, glacial ice, and icebergs. Boulders often furnish most beautifully preserved fossils, which cannot be collected from the more coherent portions of the parent ledge. From their magnitude and number they frequently give a striking expression to the landscape of the northern portion of the United States, especially in New England and Wisconsin. One at Nottingham, N. H., is estimated to weigh 6000 tons; another at Whitingham, Vt., weighs about 3000 tons. Large blocks of Scandinavian rock are scattered over the plains of Denmark, Prussia, and northern Germany. The pedestal of the statue of Peter the Great, in St. Petersburg, was hewn out of a large erratic boulder, 1500 tons in weight, that lay on a marshy plain near that city. See **BOULDER CLAY**; **GLACIER**; **GLACIAL PERIOD**; **GEOLOGY**.

BOULDER CLAY. A term applied to a deposit of compact blue or red clay occurring in the Glacial drift, and having boulders diffused throughout its mass, with here and there thin lenticular beds of gravel and sand interspersed. It is a very tough unwieldy material, sometimes more difficult to excavate than rock, and constitutes much of the hard pan under the soils of the northern States. It is found in many parts of the United States north of the terminal moraine of the continental ice sheet that existed in early Quaternary times. The boulders, which are the most striking feature of this bed, differ in size from small pebbles to masses many tons in weight. They are portions of rocks of all ages, more or less worn and often striated. The older rocks, when transported from a distance, are rounded, while those that have been derived from rocks in the neighboring districts are more angular. These masses are scattered without order in the clay, the heaviest blocks occurring frequently in the upper portions of the bed. The clay represents rock flour, produced by the grinding action of glaciers, aided by the harder rock fragments held in the ice. Layers of boulder clay vary in thickness, usually diminishing with the eleva-

tion of the point at which they are found. See **GLACIER**; **GLACIAL PERIOD**; **PLEISTOCENE PERIOD**.

BOULE, *βούλῆ* (Gk. *βούλη*, council). In ancient Greece, an advisory council. The *boule* of the Homeric times was composed of princes or leading men and was a purely consultative body, being convoked to assist the king in matters of public policy with information and advice. The Athenian *boule*, which was employed by Solon as a check on the *ecclesia* (*ἐκκλησία*), or popular assembly, was at first composed of 400 members, selected, in a manner not now ascertainable, but by election by the people, from the four tribes, 100 from each tribe, and from the three upper classes. Its duties were, properly, only to prepare matter for the discussions of the assembly, to convoke and superintend the meetings of the assembly, and to insure the execution of its decrees. The *boule* was thus, in effect, a committee of the popular assembly; in no sense was it comparable to the Roman Senate or to the Senate of an American State. The number of members of the *boule* was increased by Cleisthenes (508-507 B.C.) to 500, 50 members being taken from each of the 10 tribes into which the people were then divided; from this time its duties became more extensive, embracing matters of administration of revenue and general oversight. It made provision also for the maintenance of the navy and of the cavalry, tried cases of impeachment, received ambassadors, and introduced them to the *ecclesia*. From early in the fifth century all free-born Athenian citizens above 30 years of age were eligible to membership; they were thenceforth chosen by lot. At a still later time (306 B.C.) the number was further increased to 600, there being now 12 tribes, but in the time of Hadrian it was again reduced to 500. The meeting place of the *boule* was known as the *bouleuterion*. For the system whereby the *boule* met, not all at once, but by *prytanies*, see **ECCLÉSIA**. Consult: Schoemann, *Griechische Alterthümer*, 1^e, pp. 395 ff.; Hermann, *Griechische Staatsalterthümer*, sec. 128-127; Gilbert, *Griechische Staatsalterthümer*, 1², pp. 295 ff. (Eng. trans., pp. 265 ff.); Heydemann, *De Senatu Atheniensium* (Strassburg, 1880); Busolt, *Die Griechische Staats- und Rechtsalterthümer* (1902); J. E. Sandys, ed. of the *Constitution of Athens* (see **ARISTOTLE**).

BOULENGÉ (*βούλιν'ζαή'*) **CHRONOGRAPH**. See **BALLISTICS**.

BOULEUTERION. See **BOULE**.

BOULEVARD, *βούλ'ε-βάρ'*, or *βούλ'ε-βάρδ* (Fr. from Ger. *Bollwerk*, bulwark, bastion). A broad avenue, especially designed for promenades or driving, often lined with trees and sometimes parked or provided with trees, shrubs, and lawn. It was originally the rampart to a fortress or town. In European cities these ancient works have generally been leveled, the ditches filled up, and the space thus obtained employed for the formation of parks, promenades, and streets lined with trees. These, in France, still bear the name of boulevard. The boulevards of Paris are celebrated, and are of great service as open spaces promoting the circulation of air amidst the dense mass of habitations. Some parts of them present a bright and interesting spectacle; and as a whole, they afford a striking exhibition of the life and character of the French capital in all the different classes of society. The Thames Embankment is essentially a boulevard, formed by water-front improvement, in contrast

with the continental boulevards created on the site of abandoned fortifications. Many American cities have spent large sums of money in laying out spacious boulevards of considerable length. New York has a number of fine parkways or boulevards, especially in the boroughs of Brooklyn and Queens, and so have Boston, Chicago, and other American cities. It should be understood that the modern boulevard is really only a wider, handsomer, and more dignified street, or grand artery of travel, and that it may be radial, diagonal, or a part of a rectangular street system, as contrasted with the circumferential or ring-like boulevards which follow the sites of razed fortifications. See CITY PLANNING, STREETS

BOULGARIS See BULGARIS

BOULGER, bul'jer, GEORGE SIMONDS (1853-) An English botanist. He was born at Betchingley, Surrey, and was educated at Wellington and Epsom colleges. He was appointed professor of natural history at the Royal Agricultural College, Cirencester, in 1876, and professor of botany and geology at City of London College, in 1884. His publications include *Familiar Trees* (1886-89), *The Uses of Plants* (1889), *Biographical Index of British and Irish Botanists* (with J. Britten, 1893), *The Country Month by Month* (with J. A. Owen, 1894-95), *Elementary Geology* (1896), *Flowers of the Field* (1900, 33d ed, 1911), *Wood* (1902), *Botany* (1912), *Plant Geography* (1912).

BOULLE, bōl', or **BOULE** (formerly erroneously called Buhl) A family of distinguished French cabinetmakers—PIERRE (c 1580-1636), the eldest member of the family, emigrated from Neuchâtel to Paris, where he was employed by the King and had quarters in the Louvre. His sons Jacques and Paul followed their father's calling, but the most important member of the family was his nephew and pupil, **ANDRÉ CHARLES BOULLE** (1642-1732). He also had quarters in the Louvre, and, under the title of "marqueteur et ebeniste ordinaire du roi," enjoyed the special patronage of Louis XIV. Among his commissions for this monarch were various articles in the Queen's chamber and in the apartments of the Dauphin, Dauphine, Madame de Maintenon, and the Gallery des Glaces in the palace at Versailles, besides other work in the palace of St. Cloud. His masterpiece was the cabinet of the Dauphin, and his finest piece of furniture the marriage chests ordered by the King for this prince. Numerous examples of his art—tables, presses, writing desks, clocks, etc.—are preserved in the Louvre, the Garde-Meuble, Paris, the palaces of Versailles and Fontainebleau, the Musée Cluny, Paris, and in French and English private collections. In 1720 he had the misfortune to see all his precious models and designs destroyed by a fire which consumed his 20 workshops, and also his magnificent collection of paintings by old masters, drawings, and engravings. A poor business man, he was nearly always in debt.

André was not the inventor of the celebrated marquetry (qv) which bears his name, but he brought it to its highest perfection. It was a development of the intarsia (qv) of the Italian Renaissance. Through the skillful use of tortoise shell, copper, zinc, ivory, mother-of-pearl, etc., as inlay, endless variety of design and beauty of color were achieved—André's four sons, **JEAN PHILIPPE**, **PIERRE BENOÎT**, **CHARLES**

ANDRÉ, and **CHARLES JOSEPH**, continued their father's work, which is often difficult to distinguish from theirs. Like their father, they were usually in financial difficulties.

BOULOGNE, JEAN See BOLOGNA, GIOVANNI
BOULOGNE-SUR-MER, bōl'ōn'y'-sur-mär' (Fr. Boulogne on the sea, anciently, *Gesoriacum*, *Bononia*) A fortified seaport in the department of Pas-de-Calais, France (Map France, N, G 2). It stands at the mouth of the river Liane, on the English Channel, 22 miles southwest of Calais, and 139 miles north-northwest of Paris. The city is divided into the upper and lower, or the old and new districts. The upper city was once a great stronghold, and its ramparts are now spacious boulevards, commanding a fine marine view, with the coast of England as a horizon. At the east end stands an old castle with six turrets, which dates from 1231. In this part of the city are the fine Hôtel de Ville and the cathedral of Notre Dame, in Græco-Roman style, with a colossal statue of the Virgin surmounting the dome, which is 300 feet in height. The building was erected (1827-66) on the site of a Gothic cathedral destroyed in 1793. The lower or new town, with its broad, clean streets, is the centre of modern trade and social life. The beach affords good bathing and is very popular in summer. One of the chief objects of interest is the marble Column of the Grand Army, 176 feet high, surmounted by a bronze statue of Napoleon I, commemorating his projected invasion of England in 1804. In the lower town stand the barracks, the theatre, the museum of art, a hospital and a library. While the industries include the manufacture of steel pens, linen thread, carriages, glass, tubes, cement, etc., the main source of wealth of Boulogne is the sea, and the oyster, herring, cod, and mackerel fisheries. Its commerce consists chiefly in the importation of jute, wool, silk and woolen goods, skins, thread, coal, etc., and the exportation of wines, fruits, vegetables, cement, etc. Boulogne is one of the most frequented terminals of steamer routes from England, and a large English colony is found there. Pop., 1906, 51,201, 1911, 53,128. *Gesoriacum* was a fortress of the Gallic tribe of the Morini. In the time of Constantine the place was called Bononia. Under the Carolingians the name was changed to Bolonia. After the death of Charlemagne the Normans sacked it, it was taken by the Burgundians in 1435 and held until Louis XI added it to the French Kingdom in 1477. It was besieged by Henry VII of England in 1492, taken by Henry VIII in 1544, but restored to France by Edward VI in 1550. On Aug. 6, 1840, Louis Napoleon attempted here an insurrection. He was imprisoned in the castle. Consult Vivenot, *Notice sur la Port de Boulogne* (Paris, 1904), and Meridian, *Guide to Boulogne* (London, 1908).

BOULOGNE-SUR-SEINE, bōl'ōn'y'-sur-sân' (Fr. Boulogne on the Seine) A town of France, in the department of Seine, about 5 miles west of Paris, opposite Saint-Cloud, on the river Seine, which is crossed at this point by a fine stone bridge. It gives its name to the Bois de Boulogne, the great park and promenade of Paris (See PARIS). It has extensive linen bleacheries and perfume manufactories. Pop., 1906, 49,969, 1911, 57,027. The ancient name of Boulogne was *Menus-les-Saint-Cloud*, its present name being due to the church which was erected in the fourteenth century, in honor of

Notre Dame de Boulogne sur Mer. The church was restored in 1863.

BOULTON, hō'ton, CHARLES ARKOLL (1841-99). A Canadian soldier and legislator. He was born at Colburg, Ontario, and served in the British army from 1858 to 1868. During both of the insurrections in Manitoba, led by Louis Riel, he took an active part in the struggle against the rebels, was imprisoned and sentenced to death by them in 1870, and at the outbreak of the second rebellion, in 1885, organized and commanded a corps of mounted riflemen known as Boulton's Scouts. He was called to the Senate of the Dominion Parliament in 1889, and sided with the Liberal party in that chamber. He is the author of an interesting book, *Reminiscences of the North West Rebellion* (1886).

BOULTON, MATTHEW (1728-1809). An English manufacturer and engineer, born in Birmingham, where his father was a silver stamper and maker of all kinds of metal articles. At his father's death, in 1759, the younger Boulton continued the business, moving it in 1763 to Soho, near Birmingham. The growth of this factory and the consequent increased need of a stronger motive power than could be obtained from water led Boulton to direct his thoughts to the steam engine, which was then used only for pumping. He made experiments and constructed a model of an improved steam engine, but it was not a success. About 1767 he made the acquaintance of James Watt, who was working with Dr. John Roebuck to perfect a model engine, and offered him the use of his works at Soho for experimental purposes. In 1772 Roebuck failed, and Boulton, to whom he owed a large amount of money, took over his share in the engine patent as payment of the debt and became Watt's partner. He devoted to the enterprise all the money he could raise and was on the verge of bankruptcy before it was a commercial success. About 1787 he began to receive profit from the engine, and from that time the factory grew rapidly in size, and the capital invested in it was greatly increased. In his later life Boulton turned his attention to reform of the copper coinage, and in 1788 established at Soho a plant at which he struck coins for the Sierra Leone and East India companies and for Russia and in 1797 produced a new copper coinage for Great Britain. For his biography, consult S. Smiles, *Lives of Boulton and Watt* (London, 1865), and Thurston, *History and Growth of the Steam Engine* (New York, 1878).

BOU MAZA, bōō mā'zā, Sī MOHAMMED BEN ABDALLAH (1820-). An Arab leader of Algeria, who, as a dervish, in 1846, excited the people of Dahra against the French, and, with the support probably of Abd-el-Kader (q.v.), engaged in several conflicts. St. Arnaud made him a prisoner (1847) and sent him to Paris, where he received a pension and was provided with a home. He escaped in 1848, but was caught and sent as a prisoner to Ham, where he was kept a year and a half. He subsequently entered the Turkish army and fought in the Crimean War.

BOUNCING BET. See SOAPWORT.

BOUND, or **BOUNDARY** (OF. *bonne, bonde, bodne*, from I.L. *bodina, bodena*, bound, limit). The limiting lines of a parcel of land by which it may be known and described; being in this sense synonymous with *abuttals*, which means the "buttings" or boundings of land east, west,

north, and south. A boundary line marked by a fence, or by monuments, such as bounding stones, specified ties or the like, is usually conclusively taken to be the true boundary of land. An adjoining parcel of land, stream, or road, named in a deed as a boundary of the land conveyed, is a monument and as such fixes the boundary of the land described in preference to the courses and distances given in the description. See **MONUMENT**; **REAL PROPERTY**, and the authorities there referred to.

BOUND, or **BOUNDE**, NICHOLAS. See BOWDNE.

BOUND BAILIFF. In England, a deputy sheriff or sheriff's officer, whose duty is to discover and arrest debtors. As the sheriff is responsible for the misconduct of these bailiffs, they are annually bound in an obligation, with sureties, for the due execution of their office, whence the name *bound bailiffs*, which Blackstone is at pains to inform us "the common people have corrupted into a much more homely appellation," *bum-bailiff*. See **BAILIFF**.

BOUND BROOK. A borough in Somerset Co., N. J., 30 miles west-southwest of New York, on the Raritan River, the Delaware and Raritan Canal, and the Baltimore and Ohio, the Central of New Jersey, the Lehigh Valley, and the Philadelphia and Reading railroads (Map: New Jersey, C 2). It has manufactures of moving-picture films, stove polish, woolen goods, engines, electric dynamos, asbestos products, roofing paper and paint, graphite journal bearings, and lumber. The borough contains a public library. Settled about 1700, Bound Brook was first incorporated in 1892, the date of the charter now in operation, which provides for a mayor, elected biennially, and a city council. On April 13, 1777, 4000 English and Hessians under Lord Cornwallis and Count Donop surprised here about 1000 Americans under General Lincoln, who after a short resistance retreated, having lost 60 men in killed, wounded, and prisoners. Pop., 1900, 2622; 1910, 3970.

BOUNDING CHARTER. In Scots' law, an instrument of title which describes the lands thereby conveyed by their boundaries or limits. This is in all countries the oldest, as it is the preferred, method of describing land for the purposes of conveyance, being at the same time more accurate and more certain than a surveyor's description by courses and distances. In American and English law, instruments for the conveyance of land are called "deeds," and generally contain a description of the land conveyed according to its metes and *bounds*. See **CONVEYANCING**; **BOUND**; **MONUMENT**.

BOUNTY (Fr. *bonté*, goodness, from Lat. *bonitas*, goodness, excellence, from *bonus*, good). A term applied to any sum granted by law as an inducement to some undertaking believed to be of public importance. 1. Payments of bounties are sometimes made for the encouragement of commercial or industrial enterprises. The most important recent example of industrial bounties in the United States was the sugar bounty of two cents a pound under the tariff law of 1890. It is a question not yet determined, whether industrial bounties can be upheld under our Federal and State constitutions. In many instances they have been held by the courts to be in violation of the principle that money raised by taxation may be appropriated only for a public purpose.

The term "bounty" is also frequently applied to indirect pecuniary benefits arising out of the operation of fiscal laws, such as excessive drawbacks on exports or rebates on transportation charges on government railways. The so called sugar bounties of Germany and other European countries consisted nominally in an abatement of internal taxes upon exported sugar. But as the abatement was so measured that it was greater than the original tax, it constituted in fact, if not in name, a bounty upon exportation. For a discussion of the theory of industrial bounties, see FREE TRADE, SUBSIDIES.

2 Monetary inducements to encourage men to join the army or extend their service are common. Usually bounty is given only in those countries whose armies are recruited by voluntary enlistment. The amount given varies with the need and difficulty of procuring recruits. During the Civil War in the United States, as much as \$1000 was sometimes offered for enlistment. This was, however, owing to the magnitude of the war and the immense number of men required. The English government gives a bounty to men already serving in India to induce them to extend their service.

3 In the United States navy money is awarded a ship which sinks or destroys an enemy's ship of war. When the vessel destroyed is of equal or superior force, the victors are awarded \$200 for each person on board the enemy's ships at the beginning of the engagement, if of inferior force, \$100 for each person. If the ship is destroyed after the capture, for public interest, \$50 is awarded for each person on board the ship at the time of capture. The amount awarded is divided among the officers and crew in the same manner as prize money. When the number of persons on board the destroyed ship cannot be accurately ascertained, an estimate is made, based on the complement of a ship of the same class in the United States navy. This bounty is authorized by the United States laws, but Congress must first make an appropriation for that purpose.

BOUNTY, THE The name of an English vessel under the command of Captain Bligh, the crew of which in 1789 mutinied near the Friendly Islands and abandoned 19 men, including the captain, in a small boat with scant provisions. After many hardships the boat at last reached Timor, whence Bligh returned to England. In 1814, by the accidental discovery of a settlement on Pitcairn Island (q.v.), it was found that eight of the mutineers of the *Bounty* had escaped to the island and colonized it. The last of the mutineers died in 1829. The incident was used by Lord Byron in his poem "The Island."

BOUNTY JUMPER. In American history, one of the class of men who, while bounties were being paid for enlistments during the Civil War, entered the service with the intention of deserting soon after obtaining the promised reward. They would frequently reenlist under different names, and repeat the process until caught, one man, in 1865, confessing that he had "jumped the bounty" 32 times. The bounties differed in amount at different times and places. Consult Fry, *Report of the Provost Marshal General* (Washington, 1866), and Wilkinson, *Recollections of a Private Soldier* (New York, 1887).

BOUQUET, bōō'kă', HENRY (1719-65) A British soldier, who served for many years in America. He was born in Rolle, Switzerland,

entered the army of the Low Countries in 1736, served alternately with the Dutch and the Sardinians, and in 1756 entered the English service in America as lieutenant colonel of the "Royal American Regiment." He was second in command of the army which, under General Forbes, captured Fort Duquesne in 1758 (see PITTSBURGH), and was left in command when Forbes returned to Philadelphia. In 1763, while in command at Philadelphia, he was sent with 500 men to relieve Fort Pitt (formerly Fort Duquesne), then closely besieged by Pontiac's followers, and at Bushy Run, about 20 miles from the fort, defeated the Indians (August 5-6) and thereby virtually suppressed the great conspiracy (See PONTIAC). In October, 1764, he forced the Ohio Indians to make peace at Tuscarawas. He was raised to the rank of brigadier general and in 1765 was placed in command of the Southern Department of America with headquarters at Pensacola, where soon afterward he died of the fever. For the best account of his military services, consult Parkman, *Conspiracy of Pontiac* (Boston, 1867). Consult also an article on the subject in the *Pennsylvania Magazine of History and Biography*, vol. III (Philadelphia).

BOUQUET DE LA GRYE, bōō'kă' de la grē', JEAN JACQUES ANATOLE (1827-1909) A French hydrographer and astronomer. He was born in Thiers (Puy-de-Dôme) and was educated at the Ecole Polytechnique. One of his most important and difficult surveys was that of New Caledonia, of which region he prepared 40 charts (1853). He was the promoter of the project to make Paris a seaport by means of a ship canal and the widening of the Seme. Bouquet de la Grye was almost equally famous as an astronomer and as a perfecter of astronomical instruments. His works include *Pilote des côtes ouest de France* (2 vols.), *Notes sur le sondage a la mer*, *Etude hydrographique sur la baie de La Rochelle, Paris, Port de Mer* (1892), *Notes sur les sondes faites par de grandes profondeurs; Passage de Vénus, mission du Mencku* (1905).

BOUQUET (bōō'kă') OF WINE (Fr. *bouquet*, nōsegay, bunch of flowers, OF *bosquet*, dimin. from LL *boscos*, thicket). A flavor or aroma characteristic of the better class of wines and due chiefly to the presence of volatile constituents, as alcohols and esters. According to some authorities, the characteristic bouquets of wines are caused by the different kinds of yeast used in the various districts, the same must, fermented with yeasts from several different districts, has yielded wines possessing different bouquets. On the other hand, the bouquet of the wine from Riesling grapes is said to be caused by the action of frost.

BOUQUETIN, bōō'k-tăn' (Fr. for OF *bouc d'estain* *bouc*, goat + *de*, of + *estain*, bounded wool). A wild goat, stambouk, or ibex, especially that of the Alps or Pyrenees. See IBEX.

BOURASSA, HENRI (1868-). A Canadian journalist and political leader. He was born at Montreal and was privately educated. In 1886 he went to Montebello, of which he became mayor in 1890, and afterward to Papineauville, where also he was mayor in 1897, later removing to Montreal. While at Montebello he became editor of *L'Interprète*, and after 1897 his journalistic activity was continued in Montreal as contributor to *Le Nationaliste* and afterward as editor of *Le Devoir*, an independent newspaper. He entered Dominion politics

in 1896 as an Independent Liberal member of the House of Commons. He soon advocated Nationalist views, based on the conviction that French-Canadians hold under confederation a distinctive position not to be endangered by complications into which British rule might lead them. In 1899 Bourassa resigned his seat as a protest against French-Canadian support of Britain in the South African War (q.v.). In 1900 he was reelected by acclamation and afterward became known as the Nationalist leader. After the general election of 1908 he was elected to the Quebec provincial assembly. In 1911 he opposed the Liberal policy of reciprocity with the United States as prejudicial to the Nationalist position. He published several pamphlets expounding and defending his political opinions.

BOURBAKI, bōor'ba'kē', CHARLES DENIS SAUTER (1816-97). A French general. He was born at Pau, was educated at Saint-Cyr, served for some time in Algeria, and rose to the rank of brigadier general in 1854. In the Crimean War he won distinction at the Alma, at Inkerman, and in the assault on Sebastopol. He also participated in the Italian campaign of 1859. In 1869 he was commander of the second camp at Châlons and aid-de-camp to the Emperor. In the war with Germany he was placed in command of the Imperial Guard and took an important part in the conflicts around Metz. After having been for a short time at the head of the Army of the North, he was in December, 1870, placed in command of the Army of the Centre, soon transformed into that of the East. The advance of Bourbaki forced Van Werder to evacuate Dijon on December 27, but his attack upon Von Werder's position at Héricourt before Belfort (Jan. 15-17, 1871) was repulsed. He was compelled to retreat, but, finding his way towards Lyons cut off by the German Army of the South, was driven to despair and attempted suicide. General Clinchant assumed command of the army, which on February 1 sought refuge by crossing the frontier into Switzerland. Bourbaki returned to France, and became corps commander at Lyons in July, 1871. He retired in 1881. Consult, Grandin, *Le général Bourbaki* (Paris, 1897).

BOURBON, bōor'bon, *Fr. pron.* bōor'bôn', HOUSE OF. A younger branch of the Capetian family of France, representatives of which occupied several European thrones after the sixteenth century. The house derived its name from the castle and seignior of Bourbon, in the former province of Bourbonnais, in the centre of France, where now stands the little town and watering place of Bourbon-l'Archambault. The first lord or *sire* of this family of whom history makes mention was Adhémar, at the beginning of the tenth century. The fourth in succession from him, Archambault I, added the name of the family castle to his own. Under his successors, who also bore the name of Archambault, the family possessions were soon very much increased. At length the seignior of Bourbon devolved upon an heiress, who in 1272 married Robert, the sixth son of Louis IX of France. It thus passed to a branch of the royal family of the Capetians, under whom it was converted into a duchy. The principal branch of this family was, in 1523, deprived of all its dignities and possessions, because the Duke, Charles de Bourbon (q.v.), the famous Constable, allied himself with Charles V against

Francis I of France. Of the collateral branches, that of Vendôme acquired great importance, first attaining by marriage, in the person of Antoine de Bourbon, Duke of Vendôme, the throne of Navarre; afterward by inheritance the throne of France, in the person of Henry IV, on the extinction of the male line of the house of Valois (q.v.); and by fortune of war the thrones of Spain, Naples, and Parma. Among the numerous other collateral branches may be mentioned those of Montpensier, De la Marche, Condé, Conti, Soissons, and Orleans. Only a few members of the collateral lines, however, have borne the name of Bourbon; for example, the Cardinal Charles de Bourbon, Duke of Vendôme, who, under the name of Charles X, was set up by the Catholic League as a rival King to Henry IV. The dual dignity was revived by Louis XIV in the house of Condé (q.v.), so that the eldest son of that house should bear the title of Duke of Bourbon.

The dynasty of the Bourbons in France begins with Henry IV (q.v.), who, after the assassination of Henry III, became, by virtue of the Salic law (q.v.), the heir to the French throne. Through his father, Antoine de Bourbon, King of Navarre and Duke of Vendôme, he was descended from Robert, son of Louis IX, and husband of Beatrix, heiress of Bourbon. On his assassination in 1610, he left, by his second wife, Maria de' Medici, five legitimate children: (1) Louis XIII, his successor on the throne; (2) Gaston, Duke of Orleans (q.v.), who died in 1660, and left no male heirs; (3) Elizabeth, married to Philip IV of Spain; (4) Christina, married to Victor Amadeus, afterward Duke of Savoy; (5) Henrietta, married to Charles I of England.—Louis XIII, on his death in 1643, left two sons by his Queen, Anne of Austria, daughter of Philip III of Spain: (1) Louis XIV, his successor; and (2) Philip, who received from his elder brother the title of Duke of Orleans and was the founder of the family which has become the younger Bourbon dynasty.—The Dauphin Louis, son of Louis XIV by his marriage with Maria Theresa of Spain, died in 1711 and left three sons by his marriage with Maria Anna of Bavaria: (1) Louis, Duke of Burgundy; (2) Philip, Duke of Anjou, who afterward became King of Spain, as Philip V; (3) Charles, Duke of Berry, who died in 1714.—Louis, Duke of Burgundy, died in 1712. By his wife, Maria Adelaide of Savoy, he had three sons, of whom two died in early youth, the only one who survived being Louis XV, who succeeded his great-grandfather, Louis XIV, in 1715.—Louis XV having married Maria Leszcynska, daughter of the dethroned King Stanislas of Poland, had by her a son, the Dauphin Louis, who married Maria Josepha of Saxony and died in 1765, leaving three sons: (1) Louis XVI, who succeeded his grandfather, Louis XV, in 1774; (2) Louis Stanislas Xavier, Count of Provence, afterward Louis XVIII; (3) Charles Philippe, Count of Artois, afterward Charles X.—Louis XVI had three children by his Queen, Marie Antoinette of Austria: (1) The Dauphin Louis, who died in 1789; (2) Louis, called Louis XVII, who died in 1795; (3) Marie Thérèse Charlotte, styled Madame Royale, afterward Duchess of Angoulême.—Louis XVIII had no children; but Charles X had two sons: (1) Louise Antoine de Bourbon, Duke of Angoulême who was Dauphin prior to the Revolution of 1830 and died without issue in

1844, (2) Charles Ferdinand, Duke of Berry (q.v.), who was murdered in 1820—The Duke of Berry left two children (1) Marie Louise Thérèse, styled Mademoiselle d'Artois, married to the Duke of Parma, (2) Henri Charles Ferdinand Marie Dieudonné, Duke of Bordeaux, later styled Count of Chambord, the representative of the elder branch of the Bourbons. The latter died childless in 1883, and the Legitimists accepted in his stead the Orleanist Count of Paris, grandson of King Louis Philippe, as head of the house of Bourbon. The Count of Paris died in 1894, and his son, the Duke of Orleans, now represents legitimacy.

The founder of the Orleans or younger branch of the Bourbon royal family of France was Philip, Duke of Orleans, the younger brother of Louis XIV. He died in 1701, leaving, by his second marriage, with Elizabeth Charlotte of the Palatinate, a son of his own name as his heir, who was regent of France during the minority of Louis XV. The latter's son, Louis Philippe, Duke of Orleans (born 1703), married a princess of Baden, and died in 1752, leaving an only son of his own name (1752-85), whose son and heir was that Louis Joseph Philippe, Duke of Orleans, so notable in the French Revolution, who in 1792 renounced his rank, taking the name of Citizen Egalité, and died by the guillotine in 1793—PHILIPPE EGALITÉ left four children (1) Louis Philippe, who before the Revolution was styled Duke of Chartres—that being the ordinary title of the eldest son of the Orleans family—became afterward Duke of Orleans, was King of the French from 1830 to 1848, and died in England on Aug. 26, 1850, (2) the Duke of Montpensier, who died in England in 1807, (3) the Count of Beaujolais, who died at Malta in 1808, (4) Adelaide, styled Mademoiselle d'Orléans (1777-1847)—Louis PHILIPPE left a numerous family by his Queen, Amelia of Naples. His eldest son, Ferdinand, Duke of Orleans, lost his life in an accident on July 13, 1842, leaving by his wife, the Princess Helen of Mecklenburg-Schwerin, two sons, the eldest of whom, Louis Philippe Albert, Count of Paris (1838-94) (q.v.), left as his heir Louis Philippe Robert, Duke of Orleans, born Feb. 6, 1869. Concerning the other members of Louis Philippe's family, see LOUIS PHILIPPE.

Louis XIV having succeeded in placing his grandson, Philip, Duke of Anjou, on the throne of Spain, in 1700, as Philip V, this prince became the founder of the Spanish Bourbon dynasty, as well as of the Bourbon dynasties of Naples and Parma and Piacenza. These dynasties endured only a temporary overthrow from the policy and aims of Napoleon Bonaparte. Philip V was succeeded on the Spanish throne by his son, Ferdinand VI, who died without issue in 1759, and the crown fell to his brother, Charles III, whose son and successor, Charles IV, was compelled to resign it in 1808, in favor of a successor nominated by Napoleon, and died at Naples in 1819. The two eldest sons of Charles IV by his marriage with Maria Louisa of Parma were (1) Don Fernando, Prince of Asturias, who after the overthrow of Napoleon reigned as Ferdinand VII, whose eldest daughter was Isabella II, the mother of Alfonso XII, (2) Don Carlos (see CARLOS DE BOURBON), who in 1833 became pretender to the Spanish throne and in 1845 resigned his pretensions in favor of his son, Don Carlos, who styled himself Count of Montemolin. He died at Trieste, 1855, leaving

his claim to the Spanish throne to his nephew Don Carlos, who in turn, upon his death in 1909, left it to his son Prince Jaime. The Count of Montemolin died in 1861, and his claims to the Spanish throne are now represented by his nephew, Don Carlos, son of his brother Juan.

When the Bourbon dynasty was established on the throne of Spain in the person of Philip V, Naples and Sicily were severed from that monarchy (1713-14). Naples was given to Austria, and Sicily to Savoy, which in 1720 ceded the island to Austria in exchange for Sardinia. In the Treaty of Vienna (1735), Don Carlos, son of Philip V, became King of the Two Sicilies, as Charles III. Upon his accession to the throne of Spain in 1759, he gave up that of the Two Sicilies to his third son, Don Fernando, called Ferdinand IV, with the express stipulation that it should never again be occupied by a King of Spain. Ferdinand IV was deprived of Naples by Napoleon in 1806, but after the overthrow of Napoleon he recovered it, and in 1816 he proclaimed himself King of the consolidated realm of the Two Sicilies as Ferdinand I. His son, Francis I, left the throne in 1830 to his son Ferdinand II (q.v.), whose son, Francis II, was expelled in 1860, when Naples was incorporated with the new Kingdom of Italy.

By the Peace of Aix-la-Chapelle in 1748, Austria made over the duchies of Parma and Piacenza to Don Philip, the youngest son of Philip V of Spain, but with the stipulation of their reversion to Austria on the failure of male descendants, or on his succeeding to the throne of Spain. He was succeeded in 1765 by his son, Ferdinand I, whose son, the hereditary Prince Charles Louis, was made King of Etruria in 1801 under the guardianship of his mother, Maria Louisa of Spain, the cession of Parma and Piacenza to France on the death of Ferdinand being provided for. Ferdinand died in 1802, and in 1807 Napoleon took possession of Etruria. The Congress of Vienna assigned Parma and Piacenza for life to Maria Louisa of Austria, the spouse of Napoleon, but meanwhile indemnified Maria Louisa of Spain with the Duchy of Lucca. The latter was succeeded in 1824 by her son Charles Louis. He made over Lucca to Tuscany in 1847, and in the same year Parma and Piacenza reverted to the Bourbon family, in his person. He abdicated on March 14, 1849, and was succeeded by his son, Charles III, and he in 1854 by his son Robert—born 1848—whose mother, Marie Louise Thérèse de Bourbon, daughter of the Duke of Berry, then became regent of the duchies. The Bourbons, however, were permanently deprived of these states as well as of Naples and Sicily by the incorporation of the two duchies in the Kingdom of Italy in 1860. See ITALY and PARMA.

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France, d'Espagne, de Naples, et de Parme (Châteauroux, 1880); Stenger, *Le retour des Bourbons* (Paris, 1908).

BOURBON, bōōr'bōn', ANTOINE DE. See ANTOINE DE BOURBON.

BOURBON, CHARLES, DUKE OF (1489-1527). A French general, known as the Constable de Bourbon. He was the son of the Count of Montpensier. In consequence of the death of his elder brother, and his marriage with the only daughter of the Duke of Bourbon, he united in his own possession the vast estates of both these branches of the Bourbon family, which alone at that time retained the old feudal power. He distinguished himself by the brilliancy of his exploits in arms and by his rigid morals. Promoted at an early age to the highest military position in France, that of constable, he proved his ability by leading in 1515 the forces of Francis I across the Alps by passes hitherto deemed unpracticable. His valor contributed greatly to the victory of Francis at Marignano (Sept. 13, 14, 1515), and he followed up this success by the capture of Milan a few days later. Accounts differ as to his later career. It is charged by French historians that Charles of Bourbon was the victim of an overweening pride and jealousy, that he claimed more credit than really belonged to him, and that his treason was not at all justifiable. On the other hand, he is represented as the victim of a woman's revenge. It is said that Marie Louise, the King's mother, became enamored of the brave constable; and that he, although a widower, declined her hand, openly declaring that he deemed her a woman devoid of modesty and not to be thought of for a wife. Through her influence the estates which he had acquired through his wife were seized and his perquisites as constable were withheld. Thus deeply injured, he renounced the interest of France and concluded a private alliance with the Emperor Charles V and with Henry VIII of England for the conquest and partition of France. The King, who was engaged in an expedition to Italy, received intelligence of this conspiracy. He proceeded forthwith in person to the constable and offered him restoration to favor and also to his estates. The constable, however, did not trust him, but fled in disguise, and reached Franche-Comté in 1523. He attacked, in 1524, the French army on its march over the Alps and planned with the Spaniards an invasion of France. But Charles V did not entirely trust him and appointed the Marquis of Pescara to assist and watch him. He was forced to relinquish the siege of Marseilles on the approach of Francis I with a great army. He repossessed the Alps and took his revenge in the battle of Pavia, Feb. 24, 1525, where the King was made a prisoner. (See FRANCIS I.) He now went to Madrid, but soon found himself disappointed in his hopes and returned to Lombardy to carve out his own fortune. He took Milan from Maximilian Sforza and then assailed Rome. In the assault, May 6, 1527, he was mortally wounded by a bullet, which Benvenuto Cellini afterward asserted that he had shot. His death was kept secret for a time from the army under his command. The city was sacked, and when the army departed from Rome two months later, his corpse, which the soldiers would not part with, was taken with them and buried at Gaeta, under a magnificent monument, which, however, was afterward destroyed. (See BOURBON, HOUSE OF, for

genealogy and references.) Consult: Coignet, *Francis the First and his Times* (London, 1888); Robertson, *History of the Reign of Charles V* (Philadelphia, 1864-67); Lavisse, *Histoire de France*, vol. v (Paris); Hare, *Charles de Bourbon, High Constable of France* (London, 1910).

BOURBON, ÎLE DE. See RÉUNION, ÎLE DE LA.

BOURBON, LOUIS DE. See SOISSONS, COUNT OF.

BOURBON, LOUIS ANTOINE HENRI DE. See ENGHEN, DUC D'.

BOURBON, LUIS MARIA DE (1777-1823). A Spanish prelate and politician. He was born at Cadahalso, took orders, was appointed Archbishop of Seville in 1799, Archbishop of Toledo in 1800, and in the latter year received also the cardinal's hat. During the French occupation he was president of the Cadiz regency, and as such approved the decrees of the Constituent Assembly of the Cortes. Thus he signed the constitution of 1812 and abolished the Inquisition. The refusal of the King, on his return in 1814, to accept the constitution precipitated a revolution. Bourbon's activity gained for him the post of president of the provisional government junta then organized, and the King was forced in 1820 to give up part of his power.

BOURBON-LANCY, bōōr'bōn' lān'sē'. A watering place in the department of Saône-et-Loire, France, 40 miles northwest of Charolles (Map: France, N., J 6). It is celebrated for its thermal springs, which contain chloride of sodium and iron. The town has a hospital with 400 beds built by the Marquis d'Aligre. Pop., 1901, 4158; 1911, 4469. The Romans knew this city as Aquæ Nisinei or Nisienses, and remains of their baths are to be seen. It was a stronghold of the Bourbon family in the Middle Ages.

BOURBONNAIS, bōōr'bōnā' (so called from *Bourbon*). A former province of central France, now comprised within the departments of Allier, Cher, and Nièvre. From 1327 to 1523 it formed the Duchy of Bourbon. In the latter year it was annexed to the crown, but was bestowed, in 1661, on the house of Bourbon-Condé, which held it until the Revolution. Consult: Nicolay, *Description et histoire du Bourbonnais* (Moulins, 1875); Mauve, *Le Bourbonnais sous la Seconde République* (London, 1909).

BOURBONNAIS. A village in Kankakee Co., Ill., 56 miles south of Chicago (Map: Illinois, E 2). It is the seat of Notre Dame Convent and of St. Viator's College (Roman Catholic), opened in 1865. Pop., 1900, 595; 1910, 611.

BOURBONNE-LES-BAINS, bōōr'būn' la bān' (Fr. The Baths of Bourbonne, *Ml. Bourbonia*, in Roman times *Aqua Borvonia*, Baths of Borvo, Borvo being among the Gauls a name for Apollo). A town and watering place in the department of Haute-Marne, France, pleasantly situated by the Amana on an eminence amid wooded country, 20 miles east-northeast of Langres (Map: France, N., L 5). Saw mills and the manufacture of plaster are the chief industries. It has a fine church of the twelfth century, a large military hospital, and some interesting ruins of a château of the ancient Seigneurs de Bourbonne. Its thermal springs attract some 3000 invalids annually. They are strongly impregnated with chloride of sodium, and their temperature is from 140° to 150° F. Pop., 1901, 4014; 1911, 3707.

BOURBOULE, bōōr'bōul', LA. A health resort in the department of Puy-de-Dôme, France, on the Dordogne, 22 miles southwest of Clermont. It is noted for its mineral thermal

springs and is visited annually by over 7000 persons, while its bottled waters constitute a thriving export industry Pop, 1901, 1404, 1911, 1314

BOURCHIER, bōŕ'chî-ër, *Fr* pron bōŕ'-shyâ', ARTHUR (1864-) An English actor and manager. He was born at Speen, Berkshire, and educated at Eton and Oxford. While at the university he won distinction as an amateur actor, and in 1889 he went upon the professional stage, playing with Mrs Langtry, at Wolverhampton, as Jacques in *As You Like It*, in which he appeared in London the next year at the St James's Theatre. Later he played for a time at the Criterion. In March, 1892, he was at the Shaftesbury Theatre, in his own play of *Mr Richards*. Soon afterward he joined Augustin Daly's company and went to America, returning early in 1893 to play at Daly's London theatre, where he had the rôle of Robin Hood in Tennyson's *Foresters*. In 1894 he married Miss Violet Vanbrugh, a talented actress, who has continued upon the stage with her husband. In the fall of 1895 he took the Royalty Theatre, producing among the plays *The Ohls Widow*, an adaptation of his own, which ran for over 300 nights. Subsequently he appeared in leading parts at the Garrick, Strand, and Court theatres and, with Charles Wyndham, at Wyndham's Theatre. Then, as Wyndham's partner at the Criterion, he helped to bring out *His Excellency the Governor* and *Lady Huntworth's Experiment*. In September, 1900, he entered into the management of the Garrick Theatre, where he produced many of the best-known contemporary plays. In 1910 he joined Sir Herbert Tree at His Majesty's Theatre and made a notable success in the rôle of King Henry VIII and continued to appear there in Shakespearean repertoire during 1911.

BOURDALOUE, bōŕ'da'loo', LOUIS (1632-1704) One of the greatest preachers of France. He was born at Bourges, Aug. 20, 1632, and after having, at the age of 16, entered the order of Jesuits, obtained in succession the chairs of humanity, rhetoric, philosophy, and theological ethics in the academy of his native place. He showed a great capacity for science, but his remarkable powers of eloquence led his superiors finally to determine upon employing him as a preacher. Disdaining the inflated style prevalent among the tasteless pulpit orators of his time, he assailed with manly vigor and truly religious earnestness the passions, weaknesses, and errors of men. The dignity of his manner and the fire of his eloquence made him famous even when the public mind was occupied with the festivities of Versailles, the victories of Turenne, and the literary masterpieces of Corneille and Racine. At the court of Louis XIV he was remarkably well received. After the revocation of the Edict of Nantes (1685) he was sent to Montpellier to convert the Protestants. Bourdaloue particularly understood how to accommodate his eloquence to the minds of those whom he addressed. Simple among the simple, a dialectician among ecclesiastics, he was equally a favorite with the common people and with the learned and the great. He was also much esteemed and beloved as a man and in all circumstances maintained unimpeached a high reputation for candor and honesty. In the later years of his life he relinquished the pulpit and devoted his time to hospitals, prisons, and pious institutions. He died in Paris,

May 13, 1704. How thoroughly his religious sentiments were governed by the theological tenets of his Church may be perceived from these remarkable words which he uttered on his deathbed: "It is highly reasonable that God be fully satisfied, and at least in purgatory I will suffer with patience and with love." His *Sermons and Moral Discourses* appeared in English translation (3d ed., Dublin, 1855), also his *Married Life Its Obligations, Trials, etc.* (London, 1897), several French editions of his works have been published, e.g., *Collection universelle des orateurs sacrés*, vols. xiv-xvi, reprint of François Bretonneau's edition (6 vols., Paris, 1891). For his biography, consult Anatole Feugère, *Bourdaloue, sa prédication et son temps* (Paris, 1874, 5th ed., 1889), M. Lousas (2 vols., Paris, 1881), and L. Pouthe (Paris, 1900), also J. B. E. Tousserat, *Etude généalogique sur les Bourdaloue* (Paris, 1900), Brooke, *Great French Preachers* (London, 1904).

BOURDELLES, bōŕ'dâ'y' See BRANTÔME. **BOURDON**, bōŕ'don' (*Fr*, *It* *bordone*, a humming, a buzzing; a drone, *ML* *burdo*, drone, cf *Eng* *burden*, refrain of a song) In music, a drone bass produced by a bagpipe or hurdy-gurdy, also an organ stop, consisting of stopped wooden pipes, usually of 16-feet tone.

BOURDON, bōŕ'don', SÉBASTIEN (1616-71). A French painter, born in Montpellier. He studied in Paris under a mediocre artist named Barthélemy, and from 1634 to 1636 in Rome, where he was much influenced by his countrymen Nicholas Poussin and Claude Lorraine. After his return to Paris he firmly established his reputation by his "Martirdom of St Peter" (Louvre Gallery) and became one of the 10 original members of the Academy of Painting. In 1652-54 he was in Sweden as court painter to Queen Christina, whose portrait by him is in the National Gallery, Stockholm. He was subsequently rector of the Academy of Painting. He is known chiefly as an historical painter, but he worked also in other styles. His paintings are generally brilliant and of large grasp, but sometimes lack care in drawing and are dull in color. They further include "Descent from the Cross" (Louvre), "Julius Caesar before the Tomb of Alexander" (Louvre), "Group of Merchants" (Museum of The Hague), "Return of the Ark from Captivity" (National Gallery, London).

BOURDON DE L'OISE, bōŕ'don' de lwâz', FRANÇOIS LOUIS A notorious character of the French Revolution. He was born in the middle of the eighteenth century, at Saint-Remy, near Compiègne, and became a procurator in the Parlement of Paris. He participated in the storming of the Tuileries on Aug. 10, 1792. He shortly afterward obtained a seat in the Convention by a trick which, though subsequently discovered, did not lead to his ejection. Bourdon de l'Oise contributed much to bring about the execution of Louis XVI, the insurrection of May 31, and the destruction of the Girondists. He was sent to La Vendée, where, however, he loudly condemned the Revolutionary cruelties and assumed the attitude of a moderate. Obnoxious on this account to Robespierre and Hébert, and fearing for his head, he urged with the greatest eagerness the overthrow of the Terrorists on the 9th Thermidor (July 27), 1794. From this time forth Bourdon de l'Oise showed himself an enemy of the clubs and a protector of the nobles and the priests. In con-

sequence of the insurrection of 13th Vendémiaire (Oct. 5), 1795, he was sent as a commissioner to Chartres, where he behaved harshly and brutally. He passed from the Convention into the Council of Five Hundred, became a persecutor of the Republicans, and joined a Royalist club. The Directory placed him upon the proscribed list, after the 18th Fructidor (Sept. 4), 1797. He was transported to Cayenne (French Guiana) where in a short time he died in great misery.

BOURGAS. See BURGAS.

BOURGAULT-DUCOUDRAY, būr'gō'-dū'-kō'drā', LOUIS ALBERT (1840-1911). A French composer and writer on music, born at Nantes, Feb. 2, 1840. He began life as a lawyer, but soon abandoned that profession and entered the Conservatory at Paris, where he studied composition under A. Thomas. In 1865 he won the *Prix de Rome* with his cantata *Louise de Mémoires*. After three years of study in Italy he returned to Paris in 1868, and founded a choral society for the performance of the works of the older masters. In 1872 he went to Greece for the purpose of studying the music of the Greek church. The results of his investigations he published in the works entitled *Souvenirs d'une mission musicale en Grèce, Trente mélodies populaires de Grèce et d'Orient, and Etudes sur la musique ecclésiastique grecque*. In 1878 he was appointed professor of the history of music at the Paris Conservatoire. His compositions include a *Statut Mater*; the comic operas, *L'atelier de Prague* (1858), *Michel Colombe* (1887); the grand opera *Thamara* (1891); compositions for orchestra, *Plantasy in C minor, Carnival d'Athènes, Rhapsodie cambodienne, L'Enferment d'Ophélie*; and the choral works with orchestra, *Hymne de la joie, Prométhée, La conjuration des fleurs*.

BOURGELAT, būrzh'ā', CLAUDE (1712-79). A French lawyer, the founder of the first veterinary school in Europe. He was a learned lawyer, an able writer, and numbered among his friends such men as D'Alembert, Pembroke, Voltaire, Buffon, and Haller. He was impelled to further the cause of veterinary science by his fondness for horses. In 1761 he and a minister of Lyons, named Bertin, opened the first veterinary school in the suburbs of that city. It was patronized by students from all parts of France, Italy, Switzerland, Germany, Sweden, and Denmark. From this school all other veterinary colleges in Europe sprang, and with them it has kept pace, being superior to the majority, and rivaling the very best, even those of Paris and Berlin. His principal works are: *Elements d'hippiatrique* (3 vols., 1750-53); *Anatomie comparée du cheval, du bœuf et du mouton* (1766); *Règlement sur les écoles vétérinaires de France* (1777).

BOURG-EN-BRESSE, būr'g'ān-brēs' (Fr. fort in Bresse, an ancient province of France; anciently *Villa de Burgo in Bressia*). The chief town of the department of Ain, in France, situated on the Reyssouse, 38 miles northeast of Lyons (Map: France, S, K 2). The streets are crooked and narrow but clean, and the squares are adorned with statues and fountains. In the town are the Gothic church of Notre-Dame (1505-45), with a Renaissance portal, and the more important church of Brou (1511-36), the subject of a celebrated poem by Matthew Arnold. There are manufactories of tallow, soap, earthenware, iron goods, and mineral waters, and a trade in grain, cattle, and poultry. The church

of Brou was built by Margaret of Austria (died 1530), wife of Philibert II, Duke of Savoy, in fulfillment of a vow made by her mother-in-law, Margaret of Bourbon, and it contains the elaborate tombs of these three. Pop., 1901, 14,919; 1911, 20,545. Consult Charvet, *Les édifices de Brou à Bourg-en-Bresse* (Paris, 1897).

BOURGEOIS, būr'jōis'. See PRINTING.

BOURGEOIS, būr'zhwā', ANICET. See ANICET-BOURGEOIS.

BOURGEOIS, būr'zhwā', LÉON VICTOR AUGUSTE (1851-). A French politician. He was born in Paris and studied at the Lycée Charlemagne. In 1877 he became general secretary of the department of Marne, and in 1880 subprefect of Rheims. In 1882 he became prefect of Tarn and in 1885 of Haute-Garonne. He became director of the Ministry of the Interior in 1886, and in 1887 prefect of police. He was elected deputy for Marne in 1888, in the same year was appointed Undersecretary of State in the Ministry of the Interior, and in 1889 became Minister of the Interior. From 1890 to 1892 he was Minister of Public Instruction, and from December, 1892, to March, 1893, as Minister of Justice he vigorously prosecuted the Panama scandals. In 1895 he became Prime Minister, but having formed a Radical cabinet which the Senate refused to support, he resigned in the following year. In 1898 he became Minister of Public Instruction, but left office in the same year with the rest of the Brisson cabinet. In 1899 he was the head of the French delegation to The Hague Peace Conference, and from June, 1902, to January, 1904, presided over the Chamber of Deputies. In March, 1906, he became Minister of Foreign Affairs in the Sarrien cabinet, and in 1912 he was appointed Minister of Labor. He again headed the French representatives in the Peace Conference of 1907. He published *L'Education de la démocratie française* (1897), and *Essai d'une philosophie de la solidarité* (1897; 7th ed., 1912).

BOURGEOIS GENTILHOMME, būr'zhwā' zhān'tē'lām', LE (Fr. The Bourgeois Turned Gentleman). The title of a popular comedy by Molière (1670). Here we meet M. Jourdain, who had been "speaking prose all his life without knowing it."

BOURGEOISIE, būr'zhwā'zē'. The word is derived from the French word *bourgeois*, meaning "a citizen of a town," but it has come to refer to the social middle class as opposed both to the aristocracy and to the working class. It was the bourgeoisie of France who rose against the aristocracy in the French Revolution. Today the bourgeoisie in France and in the rest of the western world are the object of attack of the laboring classes. The adjective "bourgeois," following the social development, has, at the hands of some modern writers, come to stand for a more or less unthinking conservatism.

BOURGES, būrzh (Lat. *Bituriges*, a tribe of Gaul). The ancient capital of Berry, now of the department of the Cher, France, the seat of an archbishopric, and a military arsenal, situated in the midst of a fertile plain, at the confluence of the Annon and the Yèvre, 123 miles south of Paris (Map: France, N, H 5). High towers still mark points on the ramparts which surrounded the old town, but shady boulevards now take the place of the dismantled walls. The old town, standing in the heart of the new town, has crooked streets and quaint houses.

Its important buildings are the cathedral of St Etienne, begun in the thirteenth century, and the Palais de Justice. Bourges is a centre of trade in wine, grain, cloth, cattle, hemp, and millstones. It has iron foundries, tanneries, and cloth factories, but its prosperity depends to a great extent on government gun and powder works. Pop., 1901, 46,551, 1911 45,735. Bourges was the capital of the Gallic Bituriges, and the Roman *Avaricum*, after its capture by Julius Caesar in 52 B.C. It was successively taken by the Visigoths, under Euric, by Clovis, Pepin the Short, and the Normans. When Orleans was occupied by the English, Charles VII made it his capital. Its university, at which Calvin, Amyot, and Theodore de Beza studied, was abolished in the Revolution. It was the birthplace of the astute Louis XI, the eloquent Bourdaloue, and the famous Jacques Cœur, whose house is now the Palais de Justice. Consult Archalet, *Au pays de Jacques Cœur Bourges* (Bourges, 1900).

BOURGET, бѡржѣт, Lac no. A beautiful lake in the department of Savoie, France, 7 miles northwest of Chambéry (Map France, S, K 3). A railway which skirts its eastern shore connects Chambéry with the village of Le Bourget at the south end of the lake. The lake, inclosed by picturesque heights, is 10 miles long, 3 miles broad, and 475 feet deep, it is famed for its "lavaret," a species of fresh-water mackerel, its outlet is by the Canal de Savières on the northwest, which connects with the Rhone. The Château de Châtillon, the monastery of Hautecombe, and the ancient château of Bourdeaux are conspicuous features in the vicinity. Pop. of Le Bourget, 1901, 1309, 1911, 1340.

BOURGET, LE, or LE BOURGET-DRANCOY—A village in the French department of Seine, about 6 miles northeast of Paris (Map Paris and vicinity). In the Franco-Prussian War it was the scene of serious French repulses, especially the disasters of Oct 30 and Dec 21, 1870. Pop., 1896, 2550, 1901, 2808, 1911, 3979.

BOURGET, PAUL (1852—) A notable French analytic essayist and novelist. He was born at Amiens, Sept 2, 1852. His father was a Russian, his mother English, while he is himself a cosmopolitan by instinct, study, and travel, lacking provincial prejudices, but also national conviction—a typical scholarly dilettante. After a brilliant school career, finished at the famous Collège de Sainte-Barbe in Paris, he began life as a journalist and, as seems the French custom, made his first bow to literature in a volume of daintily hedonistic and pessimistic verse that earned him from Augier the name of "Melancholy Pig." These sighs of *Restless Life* (*La vie inquiète*, 1874), breathed in Latin Quarter cafés, were repeated in *Edel* (1878) and *Les aveux* (1882). With the *Essais de psychologie contemporaine* (1883), followed by *Nouveaux essais* (1885), and three volumes of *Études et portraits* (1888–89, 1906), Bourget appears in his own words as "a moralist of the decadence," "a maniac of psychology," and "a passionate lover of analysis." He did here as critic what he was to do later as novelist: he carried realistic observation beyond the externals of Zola and Maupassant to what he called "states of soul." Thus he unites the methods of Stendhal and of Balzac, and it is by no accident that one of the first of his essays is devoted to the former writer, whose reputation he did much to re-establish. Bourget called himself a moralist,

but he was rather an analyst, offering a brilliant diagnosis, but no prescription. His criticism reflects the dilettante skepticism of Renan, and his early fiction bears strong marks of the same influence, which even the later novels do not wholly avoid. They have been happily described as a seductive if somewhat sickly product of the hothouse of an outworn civilization, uniting intellectual keenness with morbid sensitiveness, dealing by preference with the cosmopolitan types of that low life which is usually called "high." In the early novels there is a good deal of snobbishness which he himself mocks in the later ones. *Mensonges* (1887) marks the cardinal point of his fiction. *L'Irréparable* (1884), *Cruelle énigme* (1885), *Crime d'amour* (1886), *André Cornélius* (1887), place the interest in situation and environment rather than in character. Analysis is attempted, but description predominates. In the later fiction, *Le disciple* (1889), *Terre promise* (1892), *Cosmopolis* (1892), *Un scrupule* (1893), *Steeplechase* and *Un saint* (1894), *Idylle tragique* (1896), *Les complications sentimentales* (1898), *La duchesse bleue* (1898), *Voyageuses* (translated as *Antigoné*), *Drame de famille* (1900), *Un homme d'affaires* (1900), *Le fantôme* (1901), as well as in the cynical *Psychologie de l'amour moderne* (1890), and in the impressions of travel, *Sensations d'Italie* (1891), *Nouveaux pastels* (1891), *Outre-Mer*, composed after a visit to the United States (1895), the dominant interest is in a morbid psychopathology and significantly peculiar "states of soul," though the latest volumes of fiction show increasing subtlety, maturity, and moral strength. Before *Cosmopolis* (1892) the ethical triumph is with cynical selfishness, though common-sense moralists like the Abbe in *Mensonges* occasionally find a tongue to describe their fellow-actors, justly enough, as "wretches who live at the mercy of their sensations." From *Cosmopolis* onward, Bourget swims with the wave of reaction towards religious sentiment and curiosity that came from a union of the spiritual mysticism of the Russians with the sensuous mysticism of Baudelaire and has affected the work of many others. This tendency is especially prominent in *L'Étape* (1902), with which, according to Brandes, "he enters into the ranks of Catholic souaves," and *Un divorce* (1904). *Monique* (1902) and *L'Eau profonde* (1903) are collections of tales. Bourget's style is very uneven, affected, incorrect at times, but capable of a terse simplicity that unites strength and beauty to a rare degree. In temper the impression that he leaves is of a passive disillusion. Nearly all of Bourget's work since 1892 is translated into English. He was elected to the French Academy in 1894. Among other and later works of his may be mentioned *L'Émigré* (1907), *L'Envers du décor* (1911), *La Crise* and *Pages de Critique et de Doctrine* (1912), and the *Complete Works*, 12 vols., up to 1913. Consult Renard, *Les préfaces de la jeune critique* (Paris, 1890), Doumic, *Deuxièmes d'auteurs d'aujourd'hui* (Paris, 1894), Pellissier, *Essais de littérature contemporaine* (Paris, 1893), and Lemaître, *Les contemporains*, vol. III (Paris, 1886–89), Sargent, *Les Grands Convertis* (Paris, 1906). Recent criticism of Bourget may be found in Capus, *Le théâtre de M. Paul Bourget* (Paris, 1911), Giraud, *M. Paul Bourget* (Paris, 1911), W. Stephens, *French Novelists of To-Day* (New York, 1908), and Plat, *Figures de ce Temps* (Paris, 1913). See Cynicism.

BOURGOIN, bōōr'gwān'. The capital of a canton in the department of Isère, France, on the Bourbre, 9 miles northwest of La Tour du Pin (Map: France, S., K 3). It is the seat of active linen, woolen, paper, and other industries. Situated on the ancient marsh bed of the Rhône, it was known to the Romans as *Bergusum*. Pop., 1901, 5246, 1911, 5623.

BOURGOING, bōōr'gwān', JEAN FRANÇOIS, BARON DE (1748-1811). A French diplomat, born in Nevers. He so distinguished himself in the military school in Paris that the government sent him to the University of Strassburg to prepare himself for diplomatic service. After studying there he spent four years in Germany on different military and diplomatic missions. In 1777 he was sent to Madrid as First Secretary of Legation, and during his seven years' residence there he wrote his best-known book, *Nouveau voyage en Espagne, ou Tableau de l'état actuel de cette monarchie* (3 vols., 1789). In 1791 he was made Minister Plenipotentiary of Louis XVI to Madrid, and subsequently took a conspicuous share in negotiating the peace preliminaries with Spain. In 1808 he became Minister to Saxony and was present in his official capacity at the Congress of Erfurt. In addition to the above-mentioned appointments he held numerous other diplomatic posts in Germany and Holland. His *Mémoires historiques et philosophiques sur Pie VI* (1798) is his most important historical work. He is also author of *Voyage du duc du Châtelet en Portugal* (2 vols., 1808).

BOURIGNON, bōōr'nyōn', ANTOINETTE (1616-80). A Flemish religious visionary, once very popular. She was born at Lille, Jan. 13, 1616. Her father was a merchant, and she inherited from him a considerable patrimony. She was so ugly an infant that there was some thought of killing her as a monstrous birth. Her intellect, however, was very acute, and its powers were early developed, along with a tendency to religious mysticism, which was much encouraged by the reading of mystic books, till her imagination became inflamed, and she began to fancy that she saw visions, conversed with God, received special revelations, and was called to restore the pure spirit of the Gospel. By the good offices of the Archbishop of Cambrai she obtained admission into a convent, where she won over some of the nuns to her opinions and soon found herself at the head of a considerable party. She afterward had charge of a hospital at Lille, but from this position she was driven in consequence of her extravagant fancies. She now traveled through various countries, her enthusiasm gaining proselytes, whose conversion, she said, caused her to suffer the pains of childbirth. At last she was appointed head of a hospital in East Friesland. According to Madame Bourignon, religion consists in internal emotion and not in either knowledge or practice. Among the chief exponents of Bourignonism was Peter Poirer, a Calvinistic minister. It spread to a remarkable extent among both Roman Catholics and Protestants; and about the end of the seventeenth century and the beginning of the eighteenth prevailed so much in Scotland that a solemn renunciation of it was demanded from every entrant on the ministry at his ordination. A minister of Aberdeen was deposed for it in 1701. The formal renunciation of Bourignonism is still continued in the Established Church of Scotland, but has been given up as needless by other Presbyterian churches. She died at

Franeke, Oct. 30, 1680. The works of Madame Bourignon were edited by Poirer (19 vols., Amsterdam, 1680-86; 2d ed., 1717). They exhibit not a little fiery eloquence. Several of her works—e.g., *Treatise of Solid Virtue* (1699), *Restoration of the Gospel Spirit* (1707)—have been translated into English, and *The Light of the World* reprinted (London, 1863) from the edition of 1696.

BOURINOT, bōōr're-nōt, SIR JOHN GEORGE (1837-1902). A Canadian historian, born in Sydney, Nova Scotia, Oct. 24, 1837. After graduating from Trinity College, Toronto, he turned to journalism, establishing the *Halifax Reporter*, which he conducted for many years. In 1880 he became clerk of the Dominion House of Commons, a post which he long held. He took an active part in the proceedings of the Royal Society of Canada (established 1882), of which he became president and later honorary secretary. Here first appeared several admirable papers in politics and history, afterward expanded into books. He also contributed to the leading periodicals on both sides of the Atlantic. Among his books are *Parliamentary Procedure and Practice* (1884; new ed., 1891); *Manual of Constitutional History* (1888); *Parliamentary Government in Canada* (1892); *How Canada is Governed* (1895); *Cape Breton and its Memorials of the French Régime* (1892); *Canada under British Rule* (1900); *Intellectual Development of the Canadian People* (1880); *Canada's Intellectual Strength and Weakness* (1893); *Builders of Nova Scotia* (1900); and *Lord Elgin* (1906). For his services Bourinot received academic honors from Laval University, and in 1898 he was decorated as K.C.M.G. See CANADIAN LITERATURE.

BOURKE, R.S., Sixth EARL OF MAYO. See MAYO.

BOURMONT, bōōr'mōn', LOUIS AUGUSTE VICTOR DE GHAISNES, COMTE DE (1773-1846). A French marshal. He was born Sept. 2, 1773, at Château de Bourmont in the department of Maine-et-Loire. Bourmont fought against the Republic under Condé and after 1784 in the struggle in La Vendée. Later he was sent to represent the antirevolutionary party in England. In 1799, when the insurgents in La Vendée had surrendered, Bourmont reappeared and set himself at the head of a guerrilla band, but after some brilliant successes was forced to capitulate. He soon after won the favor of the First Consul, but, becoming suspected of intrigue, was imprisoned at Besançon, whence he escaped to Portugal. When Lisbon was taken by Junot, Bourmont offered his services and, on a pledge of good faith from Junot, reentered France and received successive commissions from Napoleon until he became general of a division. During Napoleon's final struggle Bourmont vacillated and proved inconstant to Louis and Napoleon by turns. After Waterloo he received military employment under Louis XVIII, was Minister of War in 1820, and in the Algerian campaign of 1830 was made marshal. After the July Revolution he served for a brief time under the King of Portugal. He died at Bourmont, Oct. 27, 1846.

BOURNE, EDWARD GAYLORD (1860-1908). An American historian, born at Strykersville, N. Y. In 1883 he graduated with high honors at Yale, where he became professor of history in 1895. He published many critical papers on historical subjects, a number of which have been collected in a volume, *Essays in Historical Criti-*

cism (1901, 1913) They are good examples of painstaking research and the critical sifting of evidence, and one of them, "The Legend of Marcus Whitman," aroused widespread discussion and is generally considered to have settled the Whitman question (See WHITMAN, MARCUS) Professor Bourne also published *The History of the Surplus Revenue of 1837* (1885), *Historical Introduction to the Philippine Islands* (1903), *Spain in America* (1904), *Life of J. L. Motley* (1905), *Discovery, Conquest, and History of the Philippine Islands* (1907), besides editing *Roche's Spanish Colonial System* (1904) and translating *The Narrative of De Soto* (1904) and *The Voyages of Champlain* (1905)

BOURNE, GEORGE (1780-1845) An American clergyman He was born at Westbury, Wiltshire, England, visited the United States in 1802 and again in 1804, and after remaining for some time in Baltimore, settled at Harrisburg, Va There he established a printing office and did everything in his power to educate the people in his pastorate He early made himself conspicuous by advocating immediate abolition of slavery In 1815 he organized a church of non-slaveholders, and wrote a work on *The Book and Slavery Irreconcilable* (1815) His views were ultraradical for the time and brought him into constant difficulties, which led him to give up his printing office and church and move to Germantown, Pa From there he went to Sing Sing, now Ossining, N Y, then to Quebec, and finally to New York City, where he founded a paper called *The Protestant Vindicator* His works include *Lectures on Ecclesiastical History* (1822), *Pictures of Quebec* (1830), and *Slavery Illustrated in its Effects upon Women* (1834)

BOURNE, HUGH (1772-1852) The founder of the sect of Primitive Methodists He was born April 3, 1772, at Fordhays Farm, parish of Stoke-on-Trent, Staffordshire, England Originally a preacher among the Wesleyan Methodists, he distinguished himself by the fervor of his religious sentiments and by the zeal which he displayed for the conversion of the ungodly His enthusiasm for "revivals" and open-air meetings, however, received no countenance from the leading clergymen of the denomination to which he belonged, and in 1808 Bourne was cut off from the Wesleyan connection He was not, however, alarmed His preaching was wonderfully acceptable, and he quickly gathered round him many devoted adherents In March, 1810, a committee of 10 members was formed This may be regarded as the first official organization of the body The first general meeting of the society occurred the next year, and the name "Primitive Methodists" was adopted in 1812 The opprobrious name "Ranters" was given to them by their opponents In 1823 Bourne published *History of the Primitive Methodists*, a narrative of his labors and those of his coadjutors, and in 1824 founded *The Primitive Methodist Magazine*, which he edited for 20 years In the course of his life he visited Scotland, Ireland, Canada, and the United States, where his ministrations were attended with great success He died at Bemersley, in Staffordshire, Oct 11, 1852 For his biography, consult J Walford, *Memoirs*, of which only vol 1 appeared (London, 1855)

BOURNE, JONATHAN, JR (1855-) An American legislator, born in New Bedford, Mass He entered Harvard University in the class of 1877, but left college before graduation to go to

sea He was shipwrecked off the island of Formosa and was picked up and taken to a port of Oregon Thereafter he practiced law for a time, then, engaging in mining and commercial enterprises, became president of many corporations in Oregon and other States, and finally identified himself actively with Republican politics He was a member of the Oregon House of Representatives in 1885, 1896, and 1897, and in 1907 was elected to the United States Senate for the term ending 1913 Although up to this time noted rather for conservatism than radicalism in politics, he soon became one of the foremost advocates of the initiative, referendum, recall of public officials, and direct election of senators In spite of the approval which these radical measures are accorded in Oregon, Senator Bourne was defeated for nomination for reelection in 1912 During his last year in the Senate he was chairman of the Post Office Committee and had much to do with the enactment of the law providing for the parcel post

BOURNE, VINCENT (1695-1747) An English poet He studied at Westminster School, entered Trinity College, Cambridge, in 1714, and was appointed usher in Westminster School He died Dec 2, 1747 Bourne is remembered for a volume of Latin poems published in 1734 It reached a third and enlarged edition in 1743 Of Bourne, Cowper wrote extravagantly "I think him a better Latin poet than Tibullus, Propertius, Ausonius, or any of the writers in his way, except Ovid, and not at all inferior to him" Several of his poems were translated by Cowper, and by Charles Lamb, who likewise admired them greatly Their charm lies in their simplicity and grace They are marked, too, by a quiet pathos Special attention may be called to his epitaphs Consult *Poemata*, ed Mitford (London, 1840)

BOURNEMOUTH, bōrn'mūth A watering place and winter health resort on the south coast of England in Hampshire, about 30 miles west-southwest of Southampton, on Poole Bay (Map England, E 6) On account of its sheltered position, surrounding pine woods, and even temperature, it has become a favorite winter resort for persons suffering from pulmonary diseases The town received its charter of incorporation in 1890 A sanitarium for consumptives was erected in 1895, and there is also a home for convalescents Bournemouth maintains several parks and winter gardens and a golf course It has churches, hotels, a library and reading room, and assembly rooms, baths, and a pier 800 feet long Pop, 1911, 78,677

BOURNONITE, bōrn'on-īt (after Count Bournon, the discoverer) A lead-copper sulphantimonite that crystallizes in orthorhombic forms of considerable complexity, a common form of crystal resembling a cogged wheel from which is derived the common name of "wheel ore" It has a metallic lustre, is of a steel-gray color, and is found both massive and in crystals The chief localities are the Harz Mountains, Bohemia, Chile, Mexico, and, in the United States, various places in Arizona, Arkansas, and Colorado

BOURNOUS, bŭr-nōōs' See BURNOOSE

BOURRÉE, bōrr'ā' An old French dance, originated in the province of Auvergne towards the end of the sixteenth century It is in lively alla breve time, and invariably begins on the up beat In form it is binary, each part being repeated It frequently constitutes one of the movements in the older suite (qv) Each often

introduces a second bourrée, after which the first is repeated. Thus it is treated very much like the trio of the minuet (q.v.).

BOURRELET, böör'lét' (Fr. a stuffed cap, worn by children; dimin. of *bourre*, hair, wadding). In elongated projectiles with a pointed head, the imaginary line around the projectile at the junction of the cylindrical body and ogival head.

BOURRIENNE, böör'yén', LOUIS ANTOINE FAUVELET DE (1769-1834). The secretary and early friend of Napoleon I. He was born at Sens, July 9, 1769. He was educated at the military school at Brienne, where he formed an intimate friendship with Napoleon. The latter, as his influence grew, rapidly advanced Bourrienne, whose avarice, however, brought him into disgrace. Notwithstanding this, he was sent, in 1804, as chargé d'affaires to Hamburg, where he was commissioned to watch over the strict enforcement of the Continental System, but was recalled and obliged to restore a million francs which had been removed by him from the public funds (1810). In revenge, he espoused the cause of Louis XVIII, and he zealously served the Bourbons until the July Revolution. After this his reason failed him, and he died in an asylum at Caen, Feb. 7, 1834. His memoirs concerning Napoleon, the Directory, the Consulate, the Empire, and the Restoration (*Mémoires sur Napoléon*, etc., 10 vols., Paris, 1829) gave many new explanations of the events of the time, but are in many respects untrustworthy. (See **BOULAY DE LA MEURTHE**.) A work entitled *Histoire de Bonaparte par un homme qui ne l'a pas quitté depuis 15 ans* has been erroneously ascribed to him.

BOURSALT, böör'sá', EDMÉ (1638-1701). A French satirist and dramatist. Boursault won the favor of Louis XIV by his *Véritable étude des souverains*, a book written for the education of the Dauphin. His dramas, *Esope à la cour* and *Esope à la ville*, were very popular; his tragedies highly esteemed by the enemies of Racine. His *Le portrait du peintre*, an attack on Molière for his *Ecole des Femmes* provoked from Molière the caustic *Impromptu de Versailles*, where Boursault figures by name, as he did in early editions of Boileau's satires in response to his *Satyres des Satyres*. Later Boursault did Boileau a kindness, and his name was erased from that roll of dishonor. Consult Saint-René Taillandier, *Études littéraires* (Paris, 1881).

BOURSE, böörs. See EXCHANGE; STOCK EXCHANGE.

BOUSSA, böös'sá. See BUSSANG.

BOUSSET, WILHELM (1865-). A German New Testament critic and historian of religion. He was born in Lübeck, studied there, at Erlangen, Leipzig, and Göttingen, and in 1899 received the degree of doctor of theology at Heidelberg. He became professor of New Testament exegesis at Göttingen in 1896, and one of the editors of the *Theologische Rundschau* in 1897 and of *Forschungen zur Religion und Literatur des alten und neuen Testaments* in 1903; and he contributed to the *Zeitschrift für neutestamentliche Wissenschaft* and the *Encyclopaedia Biblica*. His writings on religious and church history deal especially with apocalyptic eschatology and Gnosticism. Among his books are: *Jesu Predigt in ihrem Gegensatz zum Judentum* (1892); *Textkritische Studien zum neuen Testament* (1894); *Antichrist* (1894; Eng. trans., 1896); in the

Meyer's series a *Kommentar zur Offenbarung Johannis* (1896; 2d ed., 1906); *Die Religion des Judentums in neutestamentlichen Zeitalter* (1903); *Das Wesen der Religion* (1903; 3d ed., 1905; trans. into English, Swedish, Dutch, Hungarian); *Hauptprobleme der Gnosis* (1907); and *Die Bedeutung der Person Jesu für das Glauben* (1910; Eng. trans., 1911). Bousset was active in the Christian Socialist movement. In 1913 his *Faith of a Modern Protestant* was published in New York.

BOUSSINGAULT, böös'sán'gó', JEAN BAPTISTE JOSEPH DIEUDONNÉ (1802-87). A French chemist, distinguished for investigations in agricultural chemistry. He was born in Paris and was educated at the School of Mines of St. Etienne. In the employment of an English mining company he went to South America, where, besides rendering important professional services, he served under General Bolívar in the South American war of independence. On his return to France he was appointed professor of chemistry at Lyons. In 1839 he became a member of the Institute and was appointed to the chair of agriculture in the Conservatoire des Arts et Métiers, in Paris. In 1857 he was made commander and in 1876 grand officer of the Legion of Honor. Boussingault published a large number of valuable papers embodying the results of his experimental investigations on various topics in general chemistry and particularly in agricultural science; a collection of his more important memoirs appeared in 1854. Among his highly valuable publications may be mentioned his *Economie rurale* (2 vols., 1844), which was republished in enlarged form under the title *Agronomie, chimie agricole et physiologie* (8 vols., gradually published, and partly republished, between 1860 and 1891); this work was translated into English and German and won for its author a European reputation.

BOUSSU, böös'sü'. A town in the province of Hainaut, Belgium, situated about 7 miles west of Mons, with which it is connected by rail (Map; Belgium, B 4). It contains foundries and smelting works and in its vicinity are extensive coal mines. It was the scene of two engagements between the Austrians and the French on April 28 and on Nov. 4, 1792. Pop., 1900, 10,900; 1910, 11,690.

BOUSTROPHEDON (Gk. βουστροφῆδον, *boustrophēdon*, from *bois*, *bous*, ox + *strophēai*, *strophēin*, to turn). A word descriptive of a method of writing common among the Greeks of the sixth century B.C., in which the lines were written alternately from right to left and from left to right, or conversely. The method took its name from its resemblance to the winding course taken by oxen in plowing and was transitional between the earlier method, wherein the lines all ran from right to left, and the later method, wherein they all ran from left to right. (See WRITING.) Consult E. S. Roberts, *An Introduction to Greek Epigraphy*, part i (Cambridge, 1887).

BOUTARIC, bööt'ár'ek', EDGAR PAUL (1829-77). A French historian, born at Châteaudun (Eure-et-Loir). He was appointed chief of the administrative section of the national archives, whose original documents he utilized in preparing his historical studies, which are distinguished by critical care. They deal chiefly with French institutions of the Middle Ages and include *La France sous Philippe le Bel* (1801); *Institutions militaires de la France avant les*

armées permanentes (1863), *Saint Louis et l'Alphonse de Poitiers* (1870), and other important works. Consult Bruel and Bonnasieux, *Edgar Boubouroche* (Paris, n.d.).

BOUTEL', Mrs. An English actress of the latter half of the seventeenth century. The facts of her life are to a great extent unrecorded, but she appeared at Drury Lane, then the Theatre Royal, about 1663, and before she retired from the stage in 1696 had for years been a popular actress in the London theatres, playing frequently with Betterton, Mrs. Barry, and Mrs. Bracegirdle (q.v.). She was famous, according to an old writer, for her happy presentation of the character of the "young innocent lady whom all the heroes are mad in love with," a part for which her personal charms well fitted her. Among her rôles were Aspatia, in *The Maid's Tragedy* (1666), Melantha, in *Marriage à la mode* (1672), Mrs. Pinchwife, in *Wycherley's Country Wife* (1673), Rosalinda, in *Sophonisba* (1676), Cleopatra, in *Dryden's All for Love* (1678), and Mrs. Termagant, in *The Squire of Alsatia* (1688). Her success on the stage enabled her to retire with a competence before she reached old age. Consult Genest, *History of the English Stage*, vol. II (Bath, 1832), and Doran, *Annals of the Stage*, ed. Lowe, vol. I (London, 1888).

BOUTELL, HENRY SHERMAN (1856-) An American diplomat, born in Boston, Mass., and educated at Northwestern and Harvard universities. He engaged in the practice of law at Chicago, was a member of the Illinois House of Representatives in 1884, and, from 1897 to 1911, when defeated for reelection, was a member of Congress. On March 2, 1911, he was appointed Minister to Portugal, but several weeks later Switzerland was made his destination. During his service in Congress he was one of the most efficient of Republican members and was on many important committees. In 1899 he was president of the Phi Beta Kappa Society and in 1904 received the degree of LL.D. from Northwestern University. On Jan. 2, 1913, he resigned as Minister to Switzerland to accept a seat on the Court of Claims bench.

ROUTELE, bou-têl', CHARLES ADDISON (1839-1901). An American journalist and politician, born at Damariscotta, Me. He entered the merchant marine, enlisted in the United States navy in the South Atlantic blockading squadron in 1862, and in command of the *Nyanza*, with rank of lieutenant, participated in the capture of Mobile. In 1870 he became managing editor, and in 1874 proprietor, of the *Bangor Whig and Courier*. He was a delegate to Republican national conventions in 1876, 1880, 1884, and 1888, and was a member of the National House of Representatives from the Forty-eighth to the Fifty-third Congress (1880-1901). He was particularly active as a member of the House committee on naval affairs, of which he was chairman in the Fifty-first, Fifty-fourth, and Fifty-sixth Congresses, and did much to promote the construction of the new United States navy.

BOUTERWEK, bōt'ēr-vêk, FRIEDRICH (1766-1828). A German philosopher and æsthetic writer, born near Goslar, in the Harz region. He at first studied law at Göttingen, but soon devoted his whole energies to the study of philosophy and of the history of literature. In philosophy he was at first a zealous follower of Kant, but afterward inclined more towards

Jacobi. He began to give lectures in Göttingen in 1791 and became professor of philosophy in 1797. Of his philosophical writings, *Ideen zu einer allgemeinen Ästhetik* (2 vols., 1799) is the most important, but his great work, on which his reputation really rests, is his *Geschichte der neuen Poesie und Beredsamkeit* (9 vols., Göttingen, 1801-12). The part relating to Spanish literature is especially valuable and has been translated into Spanish and much enlarged by José Gómez de la Cortina and Nicolás Hugel de Molinedo (3 vols., Madrid, 1828). A portion of it was also translated into English and published under the title *History of Spanish Literature* (1823). His writings also include three novels, *Paulus Septimus* (1795), *Graf Donamar* (1791), and *Ramiro* (1804), *Ästhetik* (2 vols., 1806), *Kleine Schriften*, with his autobiography (1818).

BOUTET DE MONVEL, LOUIS MAURICE See MONVEL, LOUIS MAURICE BOUTET DE

BOUTMY, bōt'mé', EMILE (1835-1906). A French publicist, born in Paris. He was for a time a journalist, and from 1865 to 1869 occupied the chairs of the history of civilization and of the comparative history of architecture at the École Spéciale d'Architecture. He assisted in founding the École Libre des Sciences Politiques (1872), where for a number of years he held the chair of comparative constitutional history. He was elected a member of the Academy of Moral and Political Sciences in 1898. He published several excellent works, including *Introduction au cours d'histoire comparée de l'architecture* (1869), *Études de droit constitutionnel. France, Angleterre, États-Unis* (1885), *Développement de la constitution en Angleterre* (1886), *Les Latins* (1894), *Essai d'une psychologie politique du peuple anglais au XIX^e siècle* (1901, Eng. trans., 1904), *Éléments d'une psychologie politique du peuple américain* (1902).

BOUTO, bō'tō, or INJIA A blackish or reddish porpoise-like dolphin (*Ima geoffroyensis*, or *geoffroyensis*), about 7 or 8 feet long, which abounds in the rivers of the Amazon valley, going far towards their heads. The color variations are extraordinary, some individuals being wholly pink, others black above and pink below. See DOLPHIN, TUCUXI.

BOUTROUX, bōt'rōs', ETIENNE EMILE MARIE (1845-) A French philosopher and professor at the University of Paris. He was born at Montrouge (Seine). In 1912 he was elected to the French Academy and in 1913 received an LL.D. from Princeton University. His doctrine rests upon an analysis of logical and of causal necessity and in the distinction between the point of view of quality and that of quantity. Of these two points of view, the former permits us to perceive only permanency, immobility, and fatality, while the latter enables us to distinguish motion, finality, contingency, and progress. Boutroux also published vols. I and II (1877 and 1882) of a translation of the *Philosophie der Griechen*, by Eduard Zeller, *De la contingence des lois de la nature* (1874, 6th ed., 1907), *De l'idée de loi naturelle dans la science et la philosophie contemporaines* (1895, Eng. trans., 1911), *Questions de morale et d'éducation* (1895, 4th ed., 1905), Eng. trans. by Fred Rothwell, as *Education and Ethics* (1913), *Pascal* (1900, 4th ed., 1907, Eng. trans., 1902), *William James* (1911, 2d ed., 1912, Eng. trans., London, 1912), *Henri Poincaré* (1913).

BOUTS, bouts, **DIERICK** (Dieric) (also called in English Dirk, and Thierry Bouts, after the French) (c.1420-75). One of the most prominent and influential painters of the early Netherlandish school. The year of his birth at Haarlem is variously conjectured from 1400 to 1420, the latter date being the most likely. In this case he may well have studied at Brussels with Rogier van der Weyden (q.v.), whose paintings his earliest productions most resemble; as, for example, the "Crucifixion" in the Berlin Museum. The data concerning his life are very meagre. Before 1447, the year of his first marriage, he had settled at Louvain. In 1468 he was named town painter by the town council, which visited his studio in state. He married a second time in 1475 and died May 6 of the same year. He has been wrongly confused with Steurbouts, a contemporary painter of Louvain. Little was known of his art until modern research cleared up the problem. The contract still survives for his masterpiece, the altar of the Chapel of the Sacrament, St. Peter's, Louvain (1464-68)—one of the greatest products of the early Netherlandish school. The central panel, "The Last Supper," is still in its original place. But of the four paintings which adorned the two wings, two, "Abraham and Melchizedek" and the "Fall of Man," are in the Munich Pinakothek; "Elijah in the Desert" and the "Feast of the Passover" in the Museum of Berlin. In St. Peter's, also, is a second important altar by him, representing the "Martyrdom of St. Erasmus" with Sts. Jerome and Bernard on either wing. Of his pictures for the Town Hall of Louvain, two survive in the Brussels Gallery, "The Unjust Judgment of Emperor Otho III" and the "Punishment of the Guilty Empress." Among other important paintings now attributed to him are: "The Martyrdom of St. Hippolytus," in St. Sauveur, Bruges; three panels in the Capilla Real, cathedral of Granada, "The Birth of Christ" (National Gallery, London) and the "Bewailing of Christ's Body" (Louvre), both formerly ascribed to Rogier van der Weyden, and an admirable portrait in the National Gallery said to represent the painter himself.

Bouts surpasses all of his contemporaries in color. He was the first to substitute for the bright sharp tints of the early Flemish school a softer and more subtle color scheme, based upon tone. He excelled also in composition and in representing space and atmosphere as well in the interiors as in his admirable landscapes, but he was deficient in the anatomy of his figures, which he sought to atone for by impressive countenance and gesture. This psychical expression is one of the chief charms of his pictures. After Jan van Eyck he was the most influential figure in the art of the Netherlands in the fifteenth century. Among the important painters directly influenced by him were Hugo van der Goes, Hans Memling, Gerhard David, and Quentin Metsys (q.v.). His sons, **DIERICK THE YOUNGER** and **ALBRECHT** (died 1549), continued their father's work. Consult Friedländer, *Meisterwerke der niederländischen Malerei der 15 und 16 Jahrhunderte*; Heiland, *Dirk Bouts und die Hauptwerke seiner Schule* (Strassburg, 1902); Hymans, *Gazette des Beaux-Arts* (Paris, 1902); Voll, *Die alt-niederländische Malerei* (Munich, 1906); Pierson-Gevaert, *Les primitifs Flamands* (Brussels, 1908).

BOUTS-RIMÉS, bōō'rè-má' (Fr. rhymed

endings). A kind of verse, the making of which has formed a social amusement since 1648, when a French poet introduced the diversion. Some one of the party gives out the rhymes or endings of a stanza, and the others have to fill up the lines as they best may. Suppose the rhymes prescribed are *wave, lie; brave, die*; the following is one of the ways in which the lines might be completed:

Dark are the secrets of the gulph	wave,
Where, wrapped in death, so many heroes	lie;
Yet glorious death's the guardian of the	brave,
And those who bravely live can bravely	die.

Addison ridicules the amusement in the *Spectator*, No. 60, but in French, *bouts-rimés* have been seriously composed,—the most classic instance being that of the sonnets of Etienne Mallemaens, who in 1701 wrote them on the basis of rhymes furnished him by the Duchesse du Maine.

BOUTWELL, GEORGE SEWALL (1818-1905). An American politician and cabinet officer. He was born in Brookline, Mass., was admitted to the bar in 1836, and between 1842 and 1851 was seven times chosen to the Massachusetts Legislature. Thenceforth he was a leader of the Democratic party in his State, was chosen Governor in 1851, and was reelected the next year. On the repeal of the Missouri Compromise in 1854, he left the Democratic and assisted in the organization of the Republican party. In 1862, as commissioner, he organized the new Department of Internal Revenue; in 1863 was elected to Congress, and was twice rechosen. In 1868 he was one of the managers of the impeachment of President Johnson, from 1869 to 1873 was Secretary of the Treasury, and in the latter year was elected United States Senator. In the financial business of the government he had a large share of influence and responsibility. In 1877 he was appointed by President Hayes to prepare a codification of the statutes-at-large. The result was the second edition of the *United States Revised Statutes* (1878). He was an overseer of Harvard and secretary of the Massachusetts Board of Education, and he prepared many valuable reports. In 1900 he was chosen president of the Anti-Imperialist League. He published *Educational Topics and Institutions* (1859); *Manual of the United States Direct and Revenue Tax* (1863); *The Tax-Payer's Manual* (1865); *Speeches and Papers* (1867); *The Constitution of the United States at the End of the First Century* (1895); *The Crisis of the Republic* (1900); *Reminiscences of Sixty Years in Public Affairs* (1902).

BOUVARDIA, bōō-vār'di-á (named in honor of Bouvard, physician to Louis XIII and superintendent of the Royal Gardens in Paris). A genus of 20 or 30 species of American shrubs or perennial herbs, mostly Mexican, of the family Rubiaceae. Bouvardias are cultivated to a considerable extent as late fall or early winter greenhouse plants. The red or white flowers are long and tubular, four-lobed, and contain four stamens. The fruit is a two-celled capsule. *Bouvardia triphylla* in some of its cultural forms is a favorite in borders, producing flowers from June till November.

BOUVART, or **BOUVARD**, bōō-vār', **ALEXIS** (1767-1843). A French astronomer. He was born at Les Contamines in Haute Savoie. In 1804 he was a member of the Bureau of Longitudes. He assisted Laplace in the *Mécanique*

céleste and became a member of the Academy and director of the Observatory. Bouvet discovered eight comets and was the first to point out the irregularities of the planet Uranus. The investigation of these irregularities led to the discovery of Neptune by Leverrier and Adams in 1846. He published *Nouvelles tables de Jupiter et de Saturne* (1808) and *Mémoire sur les observations météorologiques faites à l'Observatoire de Paris*.

BOUVET, bōv'vā', JOACHIM (c1662-1732) The founder of the French Jesuit Mission in China, biographer of the famous Manchu Emperor Kang-hi, and initiator of the first survey, by the Jesuits, of the Chinese Empire, which is still the basis of our maps. He was born at Mons, in Belgium. Louis XIV directed him and five other learned Jesuits, including Gerbillon, to proceed to China. They arrived there in July, 1686, and were graciously received by the Chinese Emperor. They succeeded so well in the architectural enterprises committed to them that Kang-hi permitted a church and residence to be built for them inside the Tatar city. The first treaty ever signed by the court of Peking, with the Russians, for trade, definition of frontier, and their evacuation of Albazin and Manchuria, was negotiated largely through the influence of these missionaries. In 1696 Bouvet was commissioned to bring out from France other missionaries, and in 1699 he returned with 10 fellow-Jesuits, among them the learned Parennin, and the survey of the Empire was begun. Bouvet wrote a biography of Kang-hi and an account in four languages of his various travels, besides his book, *État présent de la Chine, avec figures gravées par Griffart* (1697). On the basis of the concessions to Bouvet and Gerbillon, the French laid claims in the Treaty of Tientsin to the land and the rebuilding at Chinese expense of the great Pei Tang or Northern Cathedral in Peking, destroyed by the Boxers. Consult Michie, *The Englishman in China*, vol. viii (Edinburgh, 1900), and Smith, *China in Convulsion* (New York, 1901).

BOUVIER, bōv'vā', AUGUSTE AMI OSCAR (1826-93) A Swiss Protestant theologian. He was born in Geneva and studied at the University of Berlin (1846), and Geneva (1847-51). He was engaged in evangelical work in Paris (1853) and later went to London, where he became pastor of the Swiss church. He occupied the pulpit in the Quartier Saint-Gervais at Geneva in 1857, and four years afterward was appointed professor of practical theology at the Geneva Academy. During his visit to Germany he became strongly influenced by the views of Schleiermacher, Neander, and others, and in his works, which are characterized by scholarly research and independence of thought, he favors the gradual adoption of the principles of modern liberalism by the Evangelical party. His principal works are the following: *Époques et caractères bibliques* (1873), *Le pasteur John Bost* (1882), *Paroles de foi et de liberté* (2 vols., 1882-85), *Théologie systématique* (1887), *Étude sur la prédication de Jésus* (1892).

BOUVIER, JOHN (1787-1851) An American jurist. He was born at Codogno, Italy, but his family emigrated to America in 1802, and he was brought up in Philadelphia. In 1822 he began to practice law there and in 1838 became associate judge of the Court of Criminal Sessions. Among his publications are a valuable

Law Dictionary Adapted to the Constitution and Laws of the United States of America, and of the Several States of the American Union (1839, rev ed by F Rawle, 1897), a new ed. of *Bacon's Abridgment of the Law* (10 vols., 1841-45), *The Institutes of American Law* (4 vols., 1851), his greatest work.

BOUVINES, bōv'vèn' (anciently, Lat *Bovinum*) A small French village near Lille in France and Tournay in Belgium, noted as the scene of a victory won by Philip Augustus on July 27, 1214. Otho IV of Germany had appealed to John of England for aid against Frederick II, who was claiming the Imperial crown, the latter had made an alliance with France. Otho and John planned a double attack upon Philip Augustus. John invaded the Loire country unsuccessfully, Otho attacked the north and met the French army at Bouvines. With Otho were some vassals of Philip Augustus, including the Count of Flanders and the Count of Boulogne, some Imperial vassals, including the Count of Holland and the Duke of Brabant, and an English contingent led by William Longsword, Earl of Salisbury. The French won by superior tactics. Otho IV of Germany, defeated and crushed, lost his power, and Frederick II was soon recognized as Emperor. The possession of Normandy, Maine, Anjou, Touraine, and Poitou was assured to Philip, and this victory made a united France possible. England also became more unified after the loss of these French provinces. In its far-reaching consequences this was one of the most important battles of the Middle Ages. Consult Oman, *History of the Art of War*, vol. i, pp 461-477 (London, 1898).

BOVARY, bō'vā'rē', MADAME See MADAME BOVARY.

BO'VATE (from Lat *bos*, ox, *cow*), or OX-GANG In the mediæval manor, the space of land an ox could plow in a year, one-eighth of the carucate (q.v.). Often stated as 18 acres.

BO'VEY, HENRY TAYLOR (1853-1912) An English engineer, born in Devonshire, England. Following a Cambridge University education he spent several years in travel, and then became assistant engineer on the Mersey docks and harbor works. In 1887 he was appointed professor of civil engineering at McGill University (Canada) and on the establishment of a department of science in that institution was made dean. His publications include *Applied Mechanics* (1882), *Theory of Structures and Strength of Materials* (1893, 4th ed, 1904), *A Treatise on Hydraulics* (1895, 2d ed, 1901), *A New Extensometer* (1902), *Unification in Education* (1908).

BO'VEY COAL See LIGNITE.

BO'VIA'NUM The name of two ancient towns of Samnium. 1 Bovianum Vetus, capital of the Caraceni, conquered by the Romans in 298 B.C., now Pietrabbondante, near Agnone. Among the ruins are portions of a temple and a theatre (with three rows of seats well preserved), some Oscan inscriptions have been found on the site. 2 Bovianum Undecimanum, now Boiano, capital of the Pentri, conquered by the Romans in 311 B.C., it served as their headquarters in the Second Punic War, and as a confederate headquarters in the Social War until taken by assault by Sulla in 89 B.C. It was called Undecimanum because Vespasian established there the veterans of the Legio Undecima Claudia.

BOVIDÆ (from Lat. *bos*, gen. *bovis*, ox). A family of ruminants embracing all those having hollow persistent horns in both sexes (save in certain antelopes), combined with certain other anatomical characters. (See RUMINANT.) It includes the domestic animals that "chew the cud," and others prominent as game. These are usually divided into five subfamilies or sections, viz. (1) antelopes (*Antilopinae*); (2) goats (*Caprinae*); (3) sheep (*Ovinæ*), (4) musk oxen (*Ovibovinae*); (5) oxen (*Bovinae*). In a general way, and by typical examples, these divisions (elsewhere fully treated under their English names) are easily recognized; but when all the representatives of the family are considered, they are found to intergrade confusingly, so that some naturalists regard the sub-sections of antelopes (as the Alcephaline, etc., see ANTELOPE) as coordinate with the Caprinae, Ovinæ, etc., and opinions vary as to their interrelations: while certain forms, especially the saigas, are by some authorities excluded altogether. Some 35 genera are recognized, of which 24 are African. The most conspicuous common character is the nature of the horns, which occur in pairs and consist of hollow sheaths of hardened and thickened epidermis (see HORN), covering and supported by bony outgrowths of the skull, varying in form in the different groups. These begin to grow soon after birth, enlarging with the growth of the core, and are perfected at maturity, at which time "the core becomes excavated by the extension into it of the frontal sinuses, whence the ruminants which possess such horns are not infrequently called *Caricornia*"; once assumed, they remain permanently throughout life, forming the principal weapons of offense and defense possessed by the tribe. The distribution of the family is extensive, covering all of the Old World except Australasia, but in the Western Hemisphere it is confined to the northern continent, none being indigenous to South America. Most of them, however, show high adaptability for acclimatization, enabling the domesticated species to thrive in almost every part of the world.

BOVINO, bō-vē'nō (anciently, Lat. *Vebinum*). An episcopal city in the province of Foggia, south Italy, 2100 feet above the sea, and 20 miles southwest of Foggia (Map: Italy, K 6). It has an ancient cathedral and the ruins of an aqueduct. Its chief trade is in wine and oil. Pop., 1881 (commune), 7784; 1901, 7613; 1911, 8009.

BOW. See ARROW.

BOW (AS. *boga*, a bow to shoot with, because it is bent or bowed, cf. Ger. *Bogen*, bow, from *beugen*, to bend). A slender piece of elastic wood, with slight lateral projections at the ends between which is stretched a quantity of horse-hair, used to set into vibration the strings of instruments of the violin class. The oldest instrument played with the bow is the *rebec* (q.v.). The stick forming the bow was at first greatly curved, and a string, or cord, was tied from one end to the other. As the earliest figure of the bow is found in the Anglo-Saxon manuscripts, it is thought to be of British origin, and may have been used in the sixth century with the *oroth*, but this is not certain. The bow has been subject to various changes, the most significant of which were effected by Corelli (q.v.), until François Tourte (1747-1835) brought the art of bow making to perfection and created a model which has given him the

name of the "Stradivarius of the bow." This combines all qualities to follow every degree of tone and expression—lightness, firmness, power, and elasticity. Tourte fixes the length of the violin bow at 29-29½ inches; that of the viola at 29 inches, and that of a 'cello at 28½-28¾ inches. The stick is usually of Brazilian lancewood, or snakewood, cut to follow the grain, and slightly bent inward by exposure to heat. The nut is of ebony, or tortoise shell, and contains a screw by which the hair may be tightened or loosened. From 80 to 250 hairs from the tails of horses are used, white for the violin, viola, and violoncello, and black for the double bass. The friction is increased by application of rosin to the hair. For a brief but interesting account of the history and construction of the bow, consult Heron-Allen, *Violin-Making as It Was and Is* (London and New York, 1884).

BOW, bou (same word as *bough*, AS. *bōg*, bough, shoulder, Icel. *bögr*, shoulder), or a SHIP. A general name for the fore part, or that which breasts the waves. Very often the word is used in the plural, the ship being considered to have starboard and port, or right and left, bows, meeting at the prow or figurehead. A *narrow* or *lean* bow, and a *broad* or *bluff* bow, are seamen's phrases for different shapes of bow, each of which has its own peculiar advantage at sea; the narrow bow will cut more smoothly through the water, but a broad bow bears up more firmly in a high sea. Other forms are the *overhanging* bow, *receding* or *ram* bow, *clapper* bow, *flaring* bow, etc. "On the bow" in sea language, is the position of a distant object when seen over the bow; it implies a sweep of one-quarter of the horizon, embracing about 45° on each side of the prow or head. See BEARING; SHIPBUILDING.

BOW (bō) CHINA. A peculiar kind of porcelain, manufactured originally in England, at Stratford-le-Bow, whence the name. It is of a fine, milky-white color and is decorated with imitations of Chinese figures. Many pieces are colored in the style of Dresden china, and a characteristic decoration is a sprig of hawthorn in high relief. There were also reproduced a number of statuettes or small groups of figures modeled more or less upon German designs. The marks on Bow porcelain are usually an arrow, an anchor, a dagger, or a bow and arrow. Bow china dates from 1744, when Edward Heylyn and Thomas Frye obtained a patent for the manufacture of porcelain at Bow. They used an American clay called *unaker*, "the produce of the Cherokee Nation," which seems to have been a kind of kaolin. After grinding and washing to separate the sand and mica, powdered glass was added to the clay in proportions varying from equal parts of clay and glass to one-fifth of glass. The later Bow porcelain sometimes contained as much as 40 per cent of bone ash. For the glaze, which was a similar mixture, less of the clay was used. In 1748 Heylyn and Frye obtained another patent for a softer kind of porcelain, which was characterized by a more fusible lead glaze in which *unaker* was not used at all, but a pipe clay instead. In 1750 Messrs. Weatherly and Crowther obtained possession of the Bow works and gave them the name of New Canton. The works succeeded for a time, employing 300 operators; in 1763 Crowther, the sole surviving partner, became bankrupt, but he continued to carry on the business till 1775. In that year William Duesbury bought the Bow

works and transferred them to Derby Consult Bemrose, *Bow, Chelsea, and Derby Porcelain* (London, 1898), Wallis, *Pottery Porcelain of Derbyshire* (London, 1870), Nightingale, *Contributions toward the History of Early English Porcelain* (Salisbury, 1881), Church, *English Porcelain A Handbook* (London, 1885) See POTTERY

BOWDITCH, bou'dich, THOMAS EDWARD (1791-1824) An English traveler and writer, born in Bristol, England. He was for some time a publicity agent in the service of the African Company, but was selected in 1815 to conduct a mission to the King of Ashantee, of which he published an account in 1819, under the title, *A Mission from Cape Coast Castle to Ashantee*. On his return to Europe he published the *African Committee* (1819), which by its exposures forced the government to take its African possessions into its own hands. He then proceeded to Paris, where he spent several years perfecting himself in mathematics and natural history. To obtain funds for a new expedition into the interior of Africa, he published a translation of Mollien's *Travels in the Interior of Africa to the Source of the Senegal and Gambia* (1820), *Taaiderny* (1820), *British and Foreign Expeditions to Teembo* (1820), and in August, 1822, sailed from Havre. Stopping at Lisbon, he made a careful study of all the Portuguese discoveries, and published a work entitled *An Account of the Discoveries of the Portuguese in Angola and Mozambique* (1824). He died of fever, on the Isle of St. Mary, West Africa.

BOWDITCH, bou'dich, CHARLES PICKERING (1842-) An American archaeologist, born at Boston, a brother of Henry P. Bowditch. After graduating from Harvard University he engaged in business as the director of important manufacturing and commercial interests. Besides 10 pamphlets on Central American archaeology, he published *Mayan Nomenclature* (1906), *Maya Numeration, Calendar and Astronomy* (1910), *Bacon's Connection with the First Folio of Shakespeare* (1910).

BOWDITCH, HENRY INGERSOLL (1808-92) An American physician, a son of Nathaniel Bowditch. He was born in Salem, Mass., and in 1828 graduated at Harvard. After receiving his medical degree at that university in 1832, he spent several years in study in Paris. He was professor of clinical medicine at Harvard from 1859 to 1867, chairman of the Massachusetts State Board of Health from 1869 to 1879, physician at the Massachusetts General Hospital and the Boston City Hospital from 1868 to 1872 and president of the American Medical Association in 1877. He announced a law of soil moisture as one of the principal causes of consumption in New England, and was the first to practice the operation of thoracentesis, or puncturing of the chest cavity, in the case of pleural effusions. He was a member of the National Academy of Sciences. The following are some of his principal publications: *Life of Nathaniel Bowditch* (1865), *The Young Stethoscopist* (1848), *Public Hygiene in America* (Centennial address, Philadelphia, 1876), and translations of *Louis on Typhoid* (1836), *Louis on Phthisis* (1836) and *Mauvorn on Cataract* (1837).

BOWDITCH, HENRY PICKERING (1840-1911) An American physician, born in Boston, a brother of Charles P. Bowditch. He graduated at Harvard in 1861 and served throughout the Civil War, during which he attained the rank

of major of volunteers. He graduated at the Harvard Medical School in 1868. He was professor of physiology at the Harvard Medical School from 1876 to 1906, when he retired and became a pensioner under the Carnegie fund. His writings include *The Growth of Children* (1877), *Is Harvard a University?* (1890), *Advancement of Medicine by Research* (1896), *Hints for Teachers of Physiology* (1899).

BOWDITCH, NATHANIEL (1773-1838). An American astronomer and mathematician, born in Salem, Mass. He showed at a very early age an inclination for mathematics, though he was bled to his father's trade of a cooper and was afterward apprenticed to a ship chandler. He acquired Latin that he might study Newton's *Principia*. He particularly devoted himself to the study of the practical applications of science. He went as supercargo of a merchant ship in several long voyages and added a thorough practical acquaintance with navigation to a theoretical knowledge of it. His work, *The New American Practical Navigator* (1802, 1812), was made the standard authority of the United States Navy Department on the subject of navigation, and under direction of the Secretary of the Navy it was revised in 1880, 1903, and 1911. A new and revised edition of his *Useful Tables from the American Practical Navigator* was also issued in 1912 under orders of the department. He published also an admirable translation of Laplace's *Mécanique céleste* (2 vols, Boston, 1829), to which he added valuable annotations. These works obtained for him marks of honor from scientific societies in Great Britain and led to his being called to the professorship of mathematics and astronomy in Harvard College, which position, however, he declined, in order to enter the executive council of the State. Consult N. I. Bowditch, *Memoir of Nathaniel Bowditch* (Boston, 1839).

BOWDITCH'S PRACTICAL NAVIGATOR A compendium of information for navigators. It contains explanations of all the ordinary methods of determining the ship's position at sea, together with all the tables necessary for using them, also descriptions of instruments used in navigation, methods of making hydrographic surveys, charts, etc. The copyright of this work was purchased by the United States government, and it is now published and issued by the Hydrographic Office, United States Navy. It has been several times revised, and a considerable amount of matter has been added.

BOWDLERISM, bou'dler-iz'm. A term used to denote literary prudery or overnice expurgation. It is so named from Thomas Bowdler (1754-1825), who in 1818 published *The Family Shakespeare* in 10 vols., "in which nothing is added to the original text, but those words and expressions are omitted which cannot with propriety be read aloud in a family." The work had a large sale. Bowdler also "purified" Gibbon. More recently among works that have been absurdly Bowdlerized are the Bible, the *Arabian Nights*, *Don Quixote*, Maupassant's *Bel-Ami*, and (by its own author) "Lucas Malet's" *Sir Richard Calmady* (1901).

BOWDOIN, bou'din, JAMES (1726-90) An American politician. He was born in Boston, of French Huguenot descent, graduated at Harvard in 1745, and was subsequently a representative in the General Court, a State Senator, and a counselor. He was an early opponent of English oppression, and in 1775 was chosen Presi-

dent of the Colonial Council. In 1779 he presided over the Massachusetts Constitutional Convention and in 1785 succeeded John Hancock as Governor. In this capacity he proved his executive ability by his energetic measures in the suppression of "Shays's Rebellion" (q.v.). In 1788 he was a member of the convention that ratified the Federal Constitution. Bowdoin was one of the founders, and the first president, of the American Academy of Arts and Sciences, to which he gave his library. He also left a legacy to Harvard College and was a liberal patron of the Massachusetts Humane Society. The oldest college in Maine has been named after him.

BOWDOIN, JAMES (1752-1811). An American public man and philanthropist, born in Boston, the son of Governor Bowdoin. He graduated at Harvard, studied also at Oxford, and traveled in Europe, returning to America soon after the battle of Lexington. In 1805 he was United States Minister to Spain. He left to Bowdoin College 6000 acres of land and \$1100, the reversion of the island of Naushon, where he had his summer home, a large library and an extensive collection of minerals, paintings, and drawings.

BOWDOIN COLLEGE. The oldest seat of learning in Maine. It was chartered in 1794 by Massachusetts, and was named after James Bowdoin, Governor of Massachusetts, of which State Maine was formerly a part. The college opened at Brunswick, Cumberland County, in 1802, with Joseph McKeen, D.D., a Dartmouth graduate, as its first president. From the Hon. James Bowdoin, the son of Governor Bowdoin, the college received valuable gifts. The present buildings of the college, representing a value of about \$1,000,000, include King Chapel, the Walker Art Building, the Searles Science Building, Memorial Hall, the Hubbard Library, the Hubbard Athletic Building, the gymnasium, the Thomas Worcester Hyde Athletic Building, observatory, and dormitories. The course of study leading to the degrees of A.B. and B.S. is based on a knowledge of the ancient and modern languages and mathematics and includes such other courses as are usually given in smaller colleges of the first class. Connected with Bowdoin College is the Medical School of Maine, organized in 1820. The government of Bowdoin is administered by 13 trustees, the president and treasurer of the institution being ex officio members, and by 40 overseers. Among noted graduates of Bowdoin may be mentioned Nathaniel Hawthorne, Henry W. Longfellow, William Pitt Fessenden, Franklin Pierce, Sergeant S. Prentiss, John P. Hale, Chief Justice Melville W. Fuller, Thomas B. Reed, William P. Fryc, Gen. O. O. Howard, and Rear Admiral R. E. Peary. In 1913 Bowdoin had 82 professors and instructors, 333 academic students, and 72 medical students, and a library of 103,000 volumes. The college is nonsectarian. President, William De Witt Hyde, S.T.D.

BOWELL, bou'el, SIR MACKENZIE (1823-). A Canadian statesman. He was born in England, but removed to Canada in 1833, received a common-school education, and became editor and proprietor of the Belleville *Intelligencer*. He served in the Dominion Parliament from 1867 to 1892, as a member of the Privy Council, and as Minister of Customs. He became Minister of Militia and Defense in 1892,

and from 1894 to 1896 was Premier. Later he was leader of the Conservative Opposition in the Senate (1896-1906). He was the representative of the Senate at King George's coronation in 1911.

BOWEN, bō'en, FRANCIS (1811-90). An American author, born in Charlestown, Mass. He graduated at Harvard in 1833, and became instructor there in intellectual philosophy and political economy. He was proprietor and editor of the *North American Review* from 1843 to 1854. His reactionary political views prevented his appointment in 1850, but three years later he was appointed to the Alford professorship of natural religion, moral philosophy, and civil polity at Harvard. In philosophy and metaphysics he opposed the views of Cousin, Comte, Fichte, Kant, and Mill, and upheld those of Locke and Berkeley. Among his publications are: *Lectures on the "Application of Metaphysical and Ethical Science to the Evidences of Religion"* (1849); *Lectures on Political Economy* (1850); *Critical Essays on the History and Present Condition of Speculative Philosophy* (1842); *Documents of the Constitution of England and America, from Magna Charta to the Federal Constitution of 1789* (1854); *Principles of Political Economy* (1856); *Gleanings from a Literary Life, 1838-80* (1880); *A Layman's Study of the English Bible* (1886).

BOWEN, SM GEORGE FERGUSON (1821-99). An English administrator. He was born in Ireland and was educated at Oxford. He served for a time as president of the University of Corfu and afterward became chief secretary of government in the Ionian Islands (1854); first Governor of Queensland (1859), and Governor of New Zealand (1868), where he had the difficult task of bringing the Maori War to an end. He was Governor of Victoria from 1872 to 1879, of Mauritius from 1879 to 1883, and of Hongkong from 1883 to 1887, when he retired on a pension. In 1888, however, he was royal commissioner at Malta to report on arrangements for the new constitution granted that island. He wrote: *Ithaca in 1850*; *Murray's Handbook for Greece* (1854; 6th ed., London, 1896); *Mount Athos, Thessaly, and Epirus* (1852); *Thirty Years of Colonial Government* (1889), a collection of his dispatches and letters.

BOWEN, HENRY CHANDLER (1813-96). An American publisher, born in Woodstock, Conn. He received an academic education, came to New York in 1833, and established the firm of Bowen & McNamee, dry-goods and silk merchants. In 1843 he assisted in founding the *New York Independent*, of which he became publisher, proprietor, and editor. In 1852 his firm was boycotted in the South on account of his public denunciation of the Fugitive Slave Law and became famous for the statement that the firm had "its goods but not its principles for sale." He was long known for his annual "gatherings" at Woodstock, where very distinguished statesmen, authors, and others were entertained.

BOWEN, HERBERT WOLCOTT (1856-). An American diplomat and writer, born in Brooklyn, N. Y., and educated at the Brooklyn Polytechnic Institute, in Europe, at Yale, and at Columbia Law School. He engaged in the practice of his profession in New York City. For 15 years he was a representative of the United States abroad, first as Consul and Consul General at Barcelona, Spain, then as Minis-

ter and Consul General at Teheran, Persia, and, finally, as Minister to Venezuela. In this difficult position he remained from 1901 until 1905, when, as the result of criticism as to his conduct of affairs, he resigned and retired from the diplomatic service. He published *Verses* (1894), *Losing Ground* (1889), *In Divers Tones* (1890), *De Genere Humano* (1893), *International Law* (1895).

BOWEN, JOHN WESLEY EDWARD (1855-) An American theologian, born in New Orleans. He graduated at the universities of New Orleans and Boston, and was professor of ancient languages at Central Tennessee College (1878-82), professor of church history and systematic theology at Morgan College, Baltimore (1888-91), professor of Hebrew at Howard University, Washington (1891-92). In 1893 he became professor of the history of theology in the Gammon Theological Seminary, South Atlanta, Ga., and was later made president. He also held several pastorates and was secretary of various church organizations. His writings include *Africa and the American Negro*, *The Catholic Spirit of Methodism*, *The Theology and Psychology of the Negro Plantation Melodies*, *An Apology for the Higher Education of the Negro*, *The United Negro* (1902).

BOWENITE, bö'en-it. A massive variety of serpentine, of an apple-green or greenish-white color, that is found in Smithfield, R. I., and in other serpentine localities. It was named after George T. Bowen, who described it in 1882.

BOWER, bou'ér, ARCHIBALD (1686-1766). A Scottish ecclesiastical historian. He was born in Dundee, was educated at the Scotch College in Douai, and in 1706 was admitted to the Jesuit order. He studied divinity in Rome and Arezzo and from 1723 to 1726 was a member of the Court of the Inquisition in Macerata. In the latter year he returned to England and entered the Established church. In 1745 he was readmitted to the Jesuit order, but in 1747 professed again to have left the Church of Rome. He was severely attacked for his changes of religion and for the alleged lack of originality displayed in his *History of the Popes* (1748-66), his best-known work, and the most complete of the sort in the language. It was reprinted in Philadelphia in 1844-46, with a continuation in 3 vols. by Dr. S. H. Cox.

BOWER, FREDERICK ORPEN (1855-) An English botanist. He was born at Ripon, Yorkshire, and was educated at Trinity College, Cambridge. In 1882 he was appointed first lecturer in botany in the Normal School of Science (now Royal College of Science), and in 1885 he became regius professor of botany in the University of Glasgow. During the following four years he also acted as examiner in the University of London. His works include *A Course of Practical Instruction in Botany*, in collaboration with Professor Vines (1891), *Practical Botany for Beginners* (1894), a translation, prepared in collaboration with Dr. D. H. Scott, of the *Comparative Anatomy of Phanerogams and Ferns* by De Bary (1884), *The Origin of a Land Flora* (1908), *Plant Life on Land* (1911). His most important contributions are a series of monographs entitled *Studies in the Morphology of Spore-Producing Members*, and another series, still current, entitled *Studies in the Phylogeny of the Finales*. As indicated by these monographs, the Pteridophytes are the special subject of his investigations.

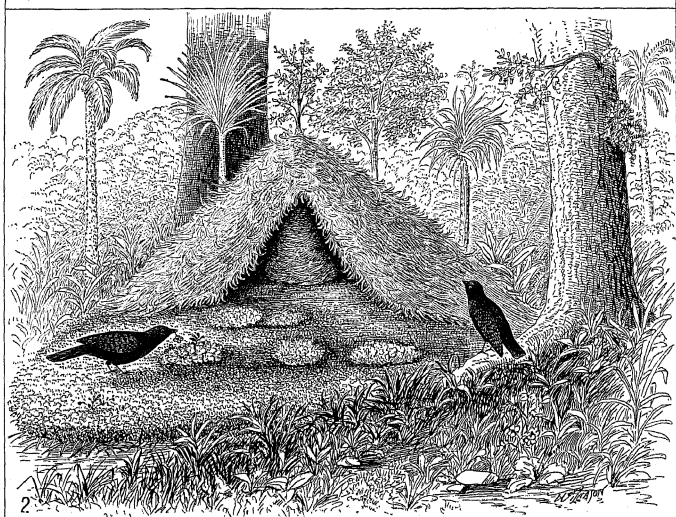
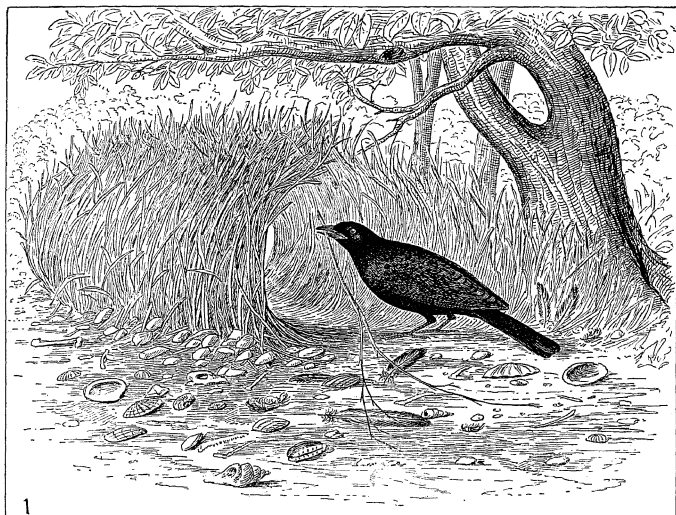
BOWER, or BOWMAKER, WALTER (1385-1449). An abbot of the monastery of St. Columba, island of Inchcolm, Firth of Forth, and one of the authors of the *Scotichronicon*. He began about 1440 his continuation of John Fordun's *Chronica Gentis Scotorum*. The work was originally divided into 16 books, of which the first five and a part of the sixth were largely by Fordun. Bower added material in the first five books and carried the account on to the death of James I (1437). The *Scotichronicon*, completed in 1447, he subsequently abridged into the manuscript now contained in the Advocates' Library of Edinburgh and known as *The Book of Cupar*. There is an edition of the *Scotichronicon*, prepared by Walter Goodall from the Edinburgh College Library manuscript and published at Edinburgh in 1759. Consult Tytler, *Lives of Scottish Worthies*, vol. 11 (London, 1845).

BOWERBANK, bou'ér-bānk, JAMES SCOTT (1797-1877). An English geologist, born in Bishopsgate, London. In 1836 he associated himself with six friends in originating "The London Clay Club" for the examination of fossils of the Tertiary formation and the preparation of a list of the species found in it. In 1840 he published a volume on the *Fossil Fruits of the London Clay*, which is still regarded as a standard work. In 1847 he was an associate founder of the Palaeontographical Society. On his retirement from active life he devoted himself to the completion of his great work on sponges, to which subject he had for many years devoted considerable study. He was an indefatigable collector, and in 1864 his collection was bought by the British Museum, of which it now forms a well-known and important division. In addition to numerous scientific papers published by him in the *Journal of the Microscopic Society*, the *Journal of the Geological Society*, etc., he is the author of the interesting contributions entitled "The Pterodactyles of the Chalk," in *Proceedings of the Zoological Society*, and of contributions to a *General History of the Spongiae*. His most important work, *A Monograph of the British Spongiae*, appeared in 4 vols., 1864-82, under the auspices of the Ray Society.

BOWER BIRD. One of certain Australasian birds remarkable for making ornamented bower-like structures, locally known as "runs," as places of resort, especially in the breeding season. They were formerly considered as members of the family of the birds of paradise, but now the numerous genera and species are placed in the family Ptilonorhynchidae. There are 14 genera embracing about 37 species. All are of moderate size and plain plumage, subsist mainly upon fruits, and breed in trees, constructing rather rude nests for their eggs, for their terrestrial bowers are not nesting places, but "playhouses." These birds were first described in 1840 by Dr. John Gould, the ornithological explorer of Australia, but much new information has since been gained. Several species are usually living and working in the Zoological Gardens in London and elsewhere.

The most familiar species is the satin bower bird (*Ptilonorhynchus holosericeus*, or *volaceus*), found over a great part of southern and eastern Australia, from Port Phillip, in Victoria, to Moreton Bay, in Queensland. It is about the size and somewhat the shape of a jackdaw, but the sexes are dissimilar, the males

BOWER BIRDS



1. BOWER OF SATIN BOWER BIRD (*Ptilonorhynchus holosericeus*).

2. HUT AND GARDEN OF THE GARDENER BOWER BIRD (*Amblyornis inornatus*).

having a plumage of satiny black, while the females and young are grayish green. In manners they exhibit great alertness and an almost irrepressible activity. "In their native wilds," writes an observer to *The Field*, of London, "the site chosen for the playground is some open spot in the most retired parts of the New South Wales forests. There, in the neighborhood of berry-bearing plants, and scrubs studded with enormous fig trees (to the fruit of which they are especially partial), having cleared the turf of all inharmonious objects and dead leaves, the male constructs a dome-shaped gallery, open at either end, and about a foot long, with the floor and sides formed of sticks and twigs. Those used for the latter are longer and more slender, and so arranged that they lean inward, nearly meeting overhead. The floor, or platform, in which the sides are firmly planted, is sometimes ornamented with a few feathers, but around the entrance are scattered every variety of decorative material, such as brightly-colored feathers, bones, and shells, which are often brought from long distances in the bush for this purpose; and scarcely a day passes without the birds making some fresh arrangement or adding to their store of curios. Like too many of their crow-like relatives, they pay little regard to the Eighth Commandment; and Mr. Gould says that the natives are in the habit of searching their arbors for anything that has been lost or dropped in the bush, and frequently recover missing articles in this way. When this summerhouse is complete, little 'at homes' are given daily, at which the males meet and pay their court to the females, and, with ruffled feathers and many bows and scrapes, go through the most absurd, not to say stately, dance, for the edification of their ladyloves, or at other times pursue them through the gallery with the utmost glee in a wild game of 'hide and seek.' The captives in zoölogical gardens seem never at rest, and when not feeding or flirting are constantly engaged in flying backward and forward through their aviary. The male never appears content with his architecture, and amuses himself by constantly pulling down his summer palace and rebuilding it in improved style."

The regent bird (*Sericulus chrysocephalus*, or *melinus*), which has a rather limited range in the region north of Sydney, and breeds along Brisbane River, is a near relative, but the fully plumaged males have rich yellow markings on the head, neck, and wings; and it builds a bower resembling that of the satin bower bird, but decorated exclusively with snail shells. It is so pugnacious that the males often kill one another in their fights at the nuptial season. Allied Queensland species of the genera *Scopætes* and *Alcedius* are not known to build bowers, but clear wide spaces of ground on which to display themselves, and ornament them with leaves, renewed as fast as they decay. To the latter genus belong the "catbirds" of southern Australia.

The spotted bower birds of the genus *Chalmydodera* form still more elaborate runs. There are several species, all characterized by the pink, collar-like marking on the necks of the males, which inhabit bushy districts in southern Australia and northern New Guinea. Their structures take the form of avenues about 3 feet long and 8 inches broad inside; the walls of upright twigs, rising from a dense platform, bend in at the top, but do not meet. This avenue and the

ground near it are always strewn with hundreds of white pebbles, shells, bleached bones, and other bright objects, which the birds delight to gather, arrange, and rearrange.

Of a different and even more remarkable character are the structures of the related gardener bird (*Amblyornis inornatus*) of New Guinea, first described by the Italian naturalist Dr. O. Beccari, in the *Annals of the Museum of Genoa* (vol. ix, p. 382, Pl. 8). Choosing a level spot in the forest, this bird clears a space around a sapling the size of a walking stick and heaps up around its base a cone of mosses about 18 inches in height. Around this is built a conical hut, made by leaning from the ground to the central pillar, at a little distance above the interior cone, thin, straw-like stems of an epiphytal orchid, which serve as rafters; these are interwoven and well thatched with others of the same sort, forming a "wigwam" open in front, but covering a gallery running around the pillar. The orchids of which it is composed retain their leaves and remain alive and blooming for a long while; and Dr. Beccari believes that they are chosen by the birds on this account. "But," he says, "the æsthetic tastes of our 'gardener' are not restricted to the construction of a cabin. Their fondness for flowers and for gardens is still more remarkable. Directly in front of the entrance to their cabin . . . is a miniature meadow of soft moss, transported thither, kept smooth and clean and free from grass, weeds, stones, and other objects not in harmony with its design. Upon this graceful green carpet are scattered flowers and fruit of different colors in such a manner that they really present the appearance of an elegant little garden. . . . Showy fungi and elegantly colored insects are also distributed about the garden and within the galleries of the cabin. When these objects have been exposed so long as to lose their freshness, they are taken from the abode, thrown away, and replaced by others." Each of these huts and its garden are believed to be the work of a single pair, or perhaps of the male alone; and they seem to be utilized year after year.

Not less remarkable is the bower of birds of the genus *Prionodura*, described by Mr. Devis in the *Transactions of the Royal Society of Queensland* for 1889 as a collection of huts looking not unlike a dwarfed camp of the aborigines.

The purpose of these structures is perhaps best characterized by the term "playhouse," and they are merely the carrying out architecturally of the same feeling which leads many other birds to resort to certain spots, and in some cases to prepare them, by scratching or other simple efforts, for the purpose of playing with one another, or of going through the dancing and antics that are a part of the method of courtship. This phase of bird life has been treated more or less by all writers upon birds, and especially for those of the North Atlantic shores by Edmund Selous in *Bird Watching* (London, 1901); but the briefest general array of such facts is contained in chap. xii of Darwin's *Descent of Man*. Many birds show a distinct preference for bright objects about them and adorn their nests for no other apparent reason than æsthetic enjoyment; and the fondness shown by the bower birds for pretty ornaments seems only the highest development of this wide tendency. They replace dying leaves and faded flowers with fresh ones, and move about and arrange their shells and pebbles precisely as if it were an amusement

and mental gratification to "play" with them and with each other in a nicely prepared place

BOWERS, bou'érz, ELIZABETH CROCKER (1830-95) An American actress. She was born at Stamford, Conn., and first appeared on the stage in 1846, at the Park Theatre, New York. The next year she was married to David P. Bowers, an actor, with whom she went to Philadelphia and remained there till his death in 1857, playing at the Walnut Street and Arch Street theatres. In 1861, after her marriage to Dr. Brown, of Baltimore, she went to London and made a great success as Julia in *The Hunchback*, and as Geraldine D'Arcy in *Woman*. Returning to New York in 1863, she played for a time at the Winter Garden. Among her favorite parts were Juliet, Lady Macbeth, Marie Antoinette, and Lady Audley. After the death of Dr. Brown (in 1867) she married J. C. McCollom, with whom she repeated many of her popular rôles. Her subsequent retirement at Philadelphia was interrupted by a return to the stage, in 1886, for several years. Under A. M. Palmer's management she appeared in *Lady Windermere's Fan* (1893), and later she supported Rose Coghlan and Olga Nethersole. Her death occurred in Philadelphia, where she made her home.

BOWERS, LLOYD WHEATON (1859-1910) An American lawyer of distinction. He was born in Springfield, Mass., graduated from Yale University in 1879 and from the Columbia Law School in 1882, in which year he was admitted to the bar. Removing to Winona, Minn., a few years later, he quickly attained distinction at the bar and in 1887 became general counsel of the Chicago and Northwestern Railway Company. Here his penetrating and well-informed mind, and his remarkable grasp of the relations of the great public-service corporations to the public interest, enabled him to render important service in the adjustment of those relations. In March, 1909, by appointment of President Taft, he became Solicitor-General of the United States, an office which he filled with unrivaled success. He left no published works.

BOWERS, THEODORE S. (1832-66) An American soldier, born in Pennsylvania. He entered the army in 1861, was appointed aid-de-camp to General Grant, and after the surrender of Vicksburg became assistant adjutant general of volunteers, serving in the field and at Washington, on General Grant's staff. He was killed by an accident in 1866. For gallant service he was brevetted lieutenant colonel, colonel, and brigadier general, U. S. A.

BOWERLY, THE (Dutch *bouwewry*, farming, farm, from *bouwer*, farmer, Ger. *Bauer*, rustic, peasant, Eng. *boor*). A broad avenue in New York City, parallel with Broadway, extending from Chatham Square to the junction of Third and Fourth avenues at Cooper Union. Its original name, the *Bouwerie*, was derived from the estates of the Governor, Peter Stuyvesant, whose farm and orchards, embracing the region lying about the upper part, were called the Great Bouwerie. Once notorious as the rendezvous of the lawless "Bowery Boy," the street at the present time has changed for the better and is characterized by heterogeneity of population and a multitude of cheap shops.

BOWFIN, bö'fin' A peculiar fish of the Mississippi valley and Great Lakes, representing an order (Cyclogonoidea or Halecomorphi) and a family (Amidae), having affinities with both ganoid and isospondylous fishes. Only a single

living species remains—the bowfin or mudfish (*Amia calva*), of sluggish streams throughout the central United States, from Lake Superior to Florida and Texas, but the group is largely represented by fossil forms, and, according to Jordan, "it is probable that the ancestors of the Isospondyli [shad, salmon, and their relatives] are to be found among forms allied to the existing Halecomorphi." The bowfin attains a length of about 2 feet and a weight of 12 pounds, and, unlike its allies, the garfishes, is covered with hard, rounded scales, the fore part of the body is cylindrical, the head stout and blunt, and the mouth filled with powerful teeth. It is exceedingly hardy, enduring absence from the water for a long time, as well as grievous injury, hence the young are the favorite live bait of anglers in the Mississippi valley, and make interesting captives in an aquarium, where, however, nothing else but snails can remain alive. These fish are strong, active, voracious, and gamy, taking a trolling spoon with avidity and resisting capture strongly. They feed upon all sorts of small aquatic creatures. They spawn late in spring, in warm shallows, among waterweeds, where the guarded eggs hatch in 8 or 10 days, after which the young remain with the parents for two or three weeks, during which time they are said to retreat into their parent's mouth for protection when danger threatens them. They do not venture into open lakes or deep water until the following season. The flesh is considered hardly eatable in the Northern States, but is a favorite with the negroes of the South. Other Northern names for this fish are dogfish and lawyer, and in the South it is known as mudfish and grindle, or John A. Grindle. Consult Hallock, *Sportsman's Gazetteer* (New York, 1877), and Goode, *Fishery Industries, Section I* (Washington, 1884). See Plate of STURGEONS, PADDLEFISH, AND BOWFIN.

BOWHEAD, bö'héd' A whalebone whale, especially the great Greenland species, in reference to the arched outline of its head. See WHALE.

BOWIE, bö'wī or bö'ī A city in Montague Co., Tex., 68 miles north of Fort Worth, on the Fort Worth and Denver and the Chicago, Rock Island, and Gulf railroads (Map Texas, D 3). It is in a rich agricultural region, producing cotton, grain, and live stock, and has oil compresses, cotton gins, and cold storage plant. The water works are owned by the municipality. Pop., 1890, 1486, 1900, 2600, 1910, 2874.

BOWIE (bö'e) KNIFE A large hunting knife often carried by pioneers of the Southwest and improved by Col. James Bowie, whose name it bears.

BOWKER, bou'kér, RICHARD ROGERS (1848-) An American editor and writer. He was born in Salem, Mass., and graduated at the College of the City of New York in 1868. He became literary editor of the New York *Evening Mail* in 1869. He was a leader in the Independent Republican or "Mugwump" movement in 1879. His publications include *Work and Wealth*, *Economos for the People*, *Copyright Its History and its Law* (1912). He also edited the *Annual Literary Index* (1892-1904), and the *Annual American Catalogue* (1886-1906).

BOWLER. See BOULDER, ERRATIC.

BOW LEG. See LEG.

BOWLES, CAROLINE. See SOUTHEY.

BOWLES, bölz, FRANCIS TIFFANT (1858-) An American naval constructor. He was

born in Springfield, Mass., graduated in 1879 at the United States Naval Academy, studied at the Royal Naval College, Greenwich, England, and was appointed to the United States naval advisory board in 1882. He was long director of repairs and construction in the Norfolk (Va.) and Brooklyn (N. Y.) navy yards, and became chief constructor of the United States navy. In 1901 he was made a rear admiral. He resigned in 1903 and became president of the Fore River Shipbuilding Company.

BOWLES, SAMUEL (1826-78). An American journalist, born in Massachusetts. For more than 30 years he was editor of the *Springfield* (Mass.) *Republican*, which had been established by his father, the elder Samuel Bowles, and which soon became one of the leading journals in New England. He traveled widely over the United States and was always warmly interested in political affairs, though never holding office. As a practical editor, Bowles stood almost in the first rank, satisfied with nothing less than the best work, sparing neither his own nor his subordinates' strength, nor hampered in his work by either fear or friendship. The *Republican* under his direction was involved in the slavery controversies as a Whig, and then as a Republican newspaper. Later it joined Horace Greeley in the Liberal Republican movement, and finally it became independent. Its vigorous, incisive editorials were the first to advocate free suffrage for both white and black, and one of the first to take up the cause of woman suffrage. Mr. Bowles's travels gave rise to the volume *Our New West* (1869), which, with his numerous editorial writings, showed him a master of clear and vigorous English. Consult G. S. Merriam, *The Life and Times of Samuel Bowles* (New York, 1885).

BOWLES, WILLIAM LISLE (1762-1850). An English poet. He was born Sept. 24, 1762, at King's Sutton, Northamptonshire, where his father was then vicar. He received his education at Winchester School, and at Trinity College, Oxford. In 1804 he became vicar of Bremhill, Wiltshire, and a prebendary of Salisbury Cathedral. Here he spent the remainder of his long life. He died at the Close, Salisbury, April 7, 1850. His poetical career began with the publication, in 1789, of *Fourteen Sonnets, Written Chiefly on Picturesque Spots during a Journey*. This unpretending volume was received with extraordinary favor; the sonnets were fresh and natural, and to many minds all the more charming because of the contrast which they presented to the style of poetry which had long been prevalent. Coleridge, Wordsworth, and Southey were among their enthusiastic admirers; and through the influence which he exercised over them, Bowles may be regarded as the founder of a school of English poetry, in which other names soon became greater than his own, but Hazlitt (q.v.) gave critical credit to Bowles. The subsequent poetical works of Bowles are very numerous, of which "The Spirit of Discovery" and "The Missionary" are generally regarded as the best of his longer blank-verse poems. Bowles was also an antiquarian of repute; and as a literary critic he was the cause of a memorable controversy on the question whether Pope was a poet. Consult Gilfillan, *Poetical Works*, with memoir (ed. Edinburgh, 1855).

BOWLINE, bô'lin (bow of a ship + line). 1. A rope fastened near the middle of the perpendicular edges of the square sails by three or

four subordinate ropes called *bridles*. It is employed to tighten the edge of the sail and make it lie flatter when sailing close to the wind. 2. A knot. See Plate of KNOTTING AND SPLICING.

BOWLING. Bowling on alleys seems to have been derived from the old game of skittles (q.v.), which, in turn, probably developed from the still older game of bowls (q.v.). It has its greatest vogue in the United States, where its popularity has increased very rapidly, especially since the latter part of the last century. The first record of a game in America was on Jan. 1, 1840, in New York City. The game grew slowly from that time until 1875, when the National Bowling League was formed. The rules were few, and the conditions of matches varied with each match until 1895, when the American Bowling Congress was formed and made rules which, with few modifications, have been used ever since. The alleys may not be less than 41 or more than 42 inches wide, and the length from the centre of pin No. 1, which is the head of a triangle of 10 pins, to the foul line behind which the bowler must deliver the ball must be 60 feet. The pin spots must be clearly marked or imbedded in the alleys and placed 12 inches apart from centre to centre. They must be $2\frac{1}{4}$ inches in diameter, the size of the bottom of the pin. The four rear pins must be placed 3 inches from the centre of the pin to the edge of the pit at the end of the alley. The pins must be 15 inches high, and their largest circumference must be 11½ inches, with a minimum weight of 3 pounds, 2 ounces. Balls may not be more than 27 inches in circumference or 16½ pounds in weight.

The aim is to bowl down all the pins in the two balls or frame which each player rolls in turn. Should the player knock down all the pins with the first ball he is credited with a *strike*, and may add to the 10 thus scored the number of points made on the next two balls that he may roll. If the pins all fall in two rolled balls, the player scores a *spare*, and to the 10 thus scored may add the points gained in the next ball he may roll. When a player makes a large number of strikes and spares in a game, the scoring becomes somewhat complex, and a large total is quickly gained. Ten frames for each player constitute a game. The variations are cocked hat, cocked hat and feather, college game, Newport game, headpin game, Glen Island, seven up, ninepins headpin out, T game, pin pool, nine up and nine down, four back, five back, white elephant, open game, seven down, and others. The American Bowling Congress has annual championship meetings in various parts of the United States, titles being awarded for four-men teams, two-men teams and individuals. Some of the world's records (in 1912) are as follows: high individual score, 280, A. B. C. tournament, 1912; high individual total for three games, 771, Canadian B. A. tournament, 1912; high two-men, single game, 523, Nat. B. A. tournament, 1908; individual, open three games, 869, average 289½, at Wilmington, Del., 1908, six games, 1628, average 271½, at Newark, N. J., 1909; three games, tournament, 824, average, 271½, at Brooklyn, N. Y., 1907. Consult Karpf, "Bowling," *Spalding's Athletic Library* (New York, annually).

BOWLING, bô'ling, TOM. 1. The name of a sailor in Smollett's *Roderick Random*. 2. The same, in a song of that title by Charles Dibdin.

BOWLING GREEN. A city and the county

seat of Warren Co., Ky., 114 miles southwest of Louisville, on the Barren River, at the head of navigation, and on the Louisville and Nashville Railroad (Map Kentucky, D 5). It is in a fertile agricultural region producing corn, hay, wheat, oats, vegetables and tobacco, and has an important trade in mules, cattle, and hogs, and its horse market is one of the largest in Kentucky. There is also a handle factory. The city has two parks, the larger of 42 acres, interesting from an historical standpoint, and contains Ogden College (non-sectarian), opened in 1877, Western Kentucky Normal School, Bowling Green Business University, and Saint Columba's Academy. Bowling Green was first incorporated in 1812, and is now governed under a charter of 1893, which provides for a mayor, elected every four years, and a city council elected on a general ticket. The water works and street electric light plant are owned and operated by the municipality. During the Civil War the place was regarded by the Confederates as of considerable strategic importance. Pop., 1890, 7803, 1900, 8226, 1910, 9178.

BOWLING GREEN. A city and the county seat of Pike Co., Mo., 90 miles northwest of St. Louis, on the Chicago and Alton and the St. Louis and Hannibal railroads (Map Missouri, E 2). It has a private academy (Pike College) and a sanatorium. The leading industrial establishments are a flour mill and a pipe factory, and there are extensive stone quarries in the vicinity. Settled in 1820, Bowling Green was incorporated in 1838. Its present government is administered under general statutes for cities of the fourth class, which provide for a mayor, elected biennially, and a board of aldermen. Pop., 1900, 1902, 1010, 1585.

BOWLING GREEN. A city and the county seat of Wood Co., Ohio, 22 miles south of Toledo, on the Cincinnati, Hamilton, and Dayton, and the Toledo and Ohio Central railroads (Map Ohio, C 3). Among the more notable features of the city are the courthouse, high school, State Normal College, and city hall buildings. It is in an agricultural district and carries on a trade in grain and general farm produce, and is the centre of a great oil and natural-gas region. There are also foundries, and manufactories of motor trucks, machinery, marine engines, and underwear. The city has a hot-water heating plant. Settled in 1832, Bowling Green was incorporated in 1854. The government, under the revised charter of 1901, is vested in a mayor, elected biennially, and a council. Pop., 1900, 5067, 1910, 5222.

BOWLING GREEN. A triangular strip of land at the foot of Broadway, New York, containing a small oval park. Early in the Dutch occupancy of New York the place was laid out as a village green and parade ground. Facing it on the south stood Fort Amsterdam, built in 1626 and torn down in 1787, when a mansion was erected on its site for Washington, who, however, did not occupy it, and it became the official residence of Governors Clinton and Jay. The Governor's mansion in turn gave way to a row of fine brick residences, the famous "Mushroom Row," in recent years occupied by steamship offices, and torn down in 1901 to make room for the new customhouse. In Colonial times the Bowling Green was surrounded by aristocratic dwellings, the site of which is now occupied by lofty office buildings. In 1770 the citizens erected on the Green an equestrian statue of George

III, which was pulled down after the reading of the Declaration of Independence on July 9, 1776, and converted into 48,000 leaden bullets for use against the English.

BOWLS, *bôlz* (Fr. *boule*, It. *bolla*, *bullo*, from Lat. *bullo*, bubble, a round object). Excepting archery, this is the oldest British outdoor sport still practiced. It was played in England as early as the thirteenth century (perhaps during the twelfth) and was brought to America apparently by the English. A resolution of the Corporation of New York, in 1732, authorized the establishment of a "Bowling Green" for the recreation and delight of the inhabitants of the city, within the tract at the southern end of the island theretofore known as "The Plane" or "The Parade." Three citizens leased the land for this purpose (at a rental of one peppercorn per annum), and prepared a strip of it for the game of bowls. This was the origin of the present name "Bowling Green," one of the very oldest geographic designations still in use in New York City. The Revolutionary War put an end to the sport in New York, and it seems to have been played very little thereafter in America until it was again introduced, in 1879, by Christian Schepflin, of Dunellen, N. J., who had seen it played in England. Within a few years clubs had been formed in many cities throughout the United States, where it is sometimes called "lawn bowls."

The *Green* should be not less than 40 yards square, as nearly level as possible, very closely cropped and surrounded by a ditch 6 inches deep and a foot wide, flanked by a terrace 2 feet high. It is divided into four "rinks," each from 19 to 21 feet wide. The *Bowl*, which is of lignum-vitæ, made with one side slightly more convex than the other, must not exceed 16½ inches in circumference nor 3½ pounds in weight. The *Jack*, a white porcelain ball about 2½ inches in diameter, is the object played for. The *Mat*, usually 22 inches long by 14 inches wide, is made of corrugated or perforated rubber, and the player must have at least one foot on it when playing. The object of the game is to place the bowl against or as near as possible to the jack. In the four-handed game the players in each rink (or team) are termed "Lead," "Second," "Third," and "Skip," the last-named being always the captain and directing the play of his team.

The Scottish form of the game provides for a contest of 32 points, 8 at each of four kinds of play, styled "drawing," "guarding," "trailing," and "driving." The game is also played (chiefly in the northern and middle counties of England) on a "crown green," which may have a maximum fall of 18 inches from the centre to the edges.

Consult Grieg, "The Game of Bowling on the Green, or Lawn Bowls," Spalding's *Athletic Library* (New York, annually), also, Elliott, "Bowling on the Green," *Canadian Magazine*, vol. xix (Toronto, 1902), Macgregor, "The Game of Bowls"—early history of the game—*Belgravia*, vol. xxxvi (London, 1878), Stephantot, "Bowling Greens"—early history—*The Antiquary*, vol. xiv (London, 1886), Manson, *The Complete Bowler* (London, 1912).

BOWMAKER, WALTER. See BOWER, WALTER. **BOWMAN,** bô'man, ALEXANDER HAMILTON (1803-65). An American soldier. He was born in Wilkesbarre, Pa., and in 1825 graduated at

West Point, where he taught for one year as assistant professor of geography, history, and ethics. He then became assistant engineer in the construction of defensive works and of harbor improvements on the Gulf of Mexico. From 1834 to 1839 he was engaged in constructing the Memphis and St. Francis military road and in improving the navigation of the Cumberland and Tennessee rivers. He was instructor of practical military engineering at West Point (1851-52) and in 1853 was appointed chief engineer of the construction bureau of the United States Treasury Department. During the Civil War he was superintendent of the United States Military Academy, with the local rank of colonel.

BOWMAN, EDWARD MORRIS (1848-1913). An American organist, pianist, choral conductor, and teacher; born in Barnard, Vt. He studied under Dr. William Mason and John P. Morgan, of New York; Weitzmann, Rohde, August Haupt, and Franz Bendel, of Berlin; Batiste and Guilman, of Paris, and Drs. MacFarren, Bridge, and E. H. Turpin, of London. In 1877 he published the *Bowman-Weitzmann Manual of Musical Theory*, a compilation from his student notes of Weitzmann's theory of harmony. This valuable textbook, indorsed by Weitzmann, was subsequently translated into German. In 1881, while in London, he passed the examination of the Royal College of Organists and became the first American associate. Beginning in 1884, he served eight terms as president of the American College of Musicians, of which he was the projector and one of the founders, and of which he afterward became honorary president and trustee. In 1895 he became organist and conductor of the Temple Choir, in connection with the Baptist Temple, in Brooklyn, N. Y., which, while popularizing, has contributed greatly to raise the standard of music, both ecclesiastical and secular, in that metropolitan borough. Mr. Bowman's compositions include songs, part songs, anthems, and orchestral numbers. One of the leading concert organists and pianists in the United States, he was also one of its most successful theorists, lecturers, and teachers. In 1891 he succeeded Dr. F. L. Ritter as professor of music in Vassar College, and in 1892 was also appointed examiner to Evelyn College, Princeton, N. J. From 1906 until his death he was musical director of Calvary Baptist Church in New York. His published lectures include: *Harmony: Historic Points and Modern Methods*; *Formation of Piano Touch*; *Relation of Musicians to the Public*.

BOWMAN, ISALAH (1878-). An American geographer, born at Waterloo, Canada. He was educated at Harvard and Yale universities and was instructor in geography at the State Normal College, Ypsilanti, Mich., in 1902-03, assistant in physiography at Harvard in 1904-05, and instructor in geography at Yale in 1905-09. In 1909 he became assistant professor at that institution and in 1907 was also leader of the Yale South American Expedition. His publications include *Forest Physiography* (1911) and *Well-Drilling Methods* (1911).

BOWMAN, THOMAS (1817-1914). An American clergyman, born in Columbia Co., Pa. He graduated at Dickinson College in 1837, studied law at Carlisle for a year, and in 1839 became a minister in the Methodist Episcopal church. He taught in the grammar school of Dickinson College from 1840 to 1843, and from 1848 to 1858 was president of the Dickinson Seminary at Williamsport, Pa., which he himself had

founded. In 1858 he was chosen president of Asbury University (now De Pauw) at Greencastle, Ind. He was chaplain to the United States Senate in 1864 and 1865. In May, 1872, he was chosen a bishop, and in 1878 he made an official visit to the Methodist missions in Europe and India. He became chancellor emeritus of De Pauw University in 1899.

BOWMAN, SIR WILLIAM (1816-92). An English ophthalmic surgeon, born at Nantwich. He studied at the General Hospital, Birmingham, at King's College, London, and on the Continent, and became a member of the Royal College of Surgeons in 1839. In 1840 he was appointed junior demonstrator of anatomy at King's College; in the same year assistant surgeon, and in 1856 full surgeon, in King's College Hospital; in 1846 assistant surgeon, and in 1851 full surgeon, in the Royal Ophthalmic Hospital, Moorfields. He was in 1843 elected to the chair of physiology and of general and morbid anatomy at King's College; in 1841 became a fellow of the Royal Society, and in 1844 of the Royal College of Surgeons. In 1880-83 he was the first president of the Ophthalmological Society of the United Kingdom. His *Lectures on the Eye* (1849) established his reputation. His services to general anatomy also were great. The results of many of his investigations in this field are to be found in papers read before the Royal Society, and in the *Anatomy and Physiology of Man*, with Todd (1843-56). His *Collected Papers* were published in 1892, edited by J. B. Sanderson and J. W. Hulke, with a memoir by H. Power.

BOWMAN'S ROOT. See GILLENIA.

BOWMANVILLE, bō'man-vil. A town in Durham Co., Ontario, Canada, on Lake Ontario and the Canadian Northern and Grand Trunk railroads, 42 miles northeast of Toronto (Map: Ontario, F 6). It manufactures agricultural machinery, iron castings, linens and woollens, pianos and organs, rubber goods, bricks, fruit and vegetable evaporators, furniture, and flour. There is trade in apples, cheese, live stock, and grain, and considerable lake commerce. It is a port of entry, with a harbor at Port Bowmanville. Pop., 1901, 2731; 1911, 2814.

BOWNE, bound, or **BOUND**, NICHOLAS (?-1613). An English clergyman. A son of Richard Bownde, physician to the Duke of Norfolk. He was educated at Cambridge and Oxford. He became famous through his treatise on the Sabbath (1st ed. 1595), in which he contended that all manner of feasting, as well as May games, shooting, bowling, dances, and all other sports, were a profanation of the seventh day, which he held had been ordained as one of rest, similarly to the Jewish Sabbath. The so-called Sabbatarian Question, which thereby arose, constituted the first point of doctrinal difference between the High-Church party and the Puritans, and expressed the principal point of distinction between the two parties. In 1611 he was called to the pastorate of the church of St. Andrew the Apostle at Norwich, which position he held until his death. Among his published works are *The Doctrine of the Sabbath*, *Plainly Layde Forth* (1595); *The Holy Exercise of Fasting* (1604); and a *Table from the Beginning of the World to this Day, wherein is Declared in what Teere of the World Everything was Done* (1593).

BOWNE, boun, BORDEN PARKER (1847-1910). An American philosopher and educator, born at

Leonardville, N J He graduated at New York University in 1871, studied at Halle and Göttingen, and in 1876 was appointed professor of philosophy at Boston University His publications include *The Philosophy of Herbert Spencer* (1874), *Introduction to Psychological Theory* (1886), *Principles of Ethics* (1892), *The Christian Revelation* (1898), *The Christian Life* (1899), *The Immanence of God* (1905), *Kant and Spencer, a Critical Exposition* (1912)

BOWNOCKER, JOHN ADAMS (1865-). An American geologist, born at St. Paul, Ohio After graduating from Ohio State University he was principal of the high school at Martins Ferry, Ohio, in 1889-92, was assistant in 1892 on the Geological Survey of Ohio, and in 1893, on that of New Jersey, took up teaching at Ohio State University as assistant in 1895, and became assistant professor in 1898, associate professor of inorganic geology in 1899, and professor in 1901 In 1906 he was made State geologist of Ohio His publications include *The Oil- and Gas-Producing Rocks of Ohio* (1902) and *The Central Ohio Natural Gas Fields* (1903)

BOWRING, bow'ring, Sir JOHN (1792-1872) An English politician, linguist, and author He was born at Exeter, Oct 17, 1792 He early devoted himself to the study of languages, in the acquisition of which he displayed an unusual degree of talent The national poetry of different peoples had great attraction for him, and he rendered valuable service to literature by collecting and translating both the more ancient and the more modern popular poems of almost all the countries of Europe He edited the collected works of his friend, Jeremy Bentham He became the first editor of the *Westminster Review*, established in 1824 In 1828 he visited Holland, and his letters—which appeared in the *Morning Herald* and were afterward translated into Dutch—procured for him the degree of doctor of laws from the University of Groningen Subsequent travels were undertaken on a commission from the British government He visited Switzerland, Italy, Egypt, Syria, and finally the States of the German Zollverein, and everywhere found materials for valuable reports He was a member of the House of Commons from 1835 to 1837 and again from 1841 to 1849 and actively promoted the adoption of free trade In 1849 Bowring was appointed British consul at Hongkong, and superintendent of trade in China He returned in 1853, and in the following year was made knight, and subsequently Governor of Hongkong In 1856, an insult having been offered to a Chinese vessel, said to have been under the protection of the British flag, Bowring, without consulting the home government, ordered an attack on certain Chinese forts—a proceeding which excited considerable dissatisfaction in Great Britain In 1855 he concluded a commercial treaty with Siam and gave an interesting account of his visit in *The Kingdom and People of Siam* In 1858 he visited Manila and afterward published an account of the Philippine Islands He died Nov 23, 1872 Consult his *Autobiographical Reminiscences* (London, 1877), ed by Levin Bowring, Sir John's third son, who died in 1910

BOWSER, bow'zer, EDWARD ALBERT (1845-1910) An American mathematician, born at Sackville, New Brunswick He graduated at Rutgers College in 1868, was appointed pro-

fessor of mathematics there in 1870, and director of the United States Geodetic Survey of New Jersey in 1875 His publications include *Analytic Geometry* (1880), *Differential and Integral Calculus* (1880), *Analytic Mechanics* (1884), *Hydromechanics* (1885), *College Algebra* (1888), *Plane and Solid Geometry* (1890), *Treatise on Trigonometry* (1892), *Logarithmic Tables* (1895), *A Treatise on Roofs and Bridges* (1898)

BOWSPRIT, bō'sprit' (bow + sprit, OE *spret*, a spear) A large boom, spar, or mast projecting over the stem or head of a ship Its use is to carry sail forward, as a means of counteracting the effect of the after sails and keeping the ship well balanced It is also one of the chief supports of the foremast, which is fastened to it by large stays or ropes In ordinary ships, the bowsprit rises at an angle of about 30° from the horizon It is secured in place by heavy framing at the *heel* or inboard end—just inside the bow by iron straps or lashings of wire rope called the *gammoning*, which hold it down to the stem, and outside the ship by the *bobstays*, which extend from the bowsprit to the cutwater

BOWSTRING (bō'string') **HEMP** See **HEMP**, **BOWSTRING**

BOW WINDOW See **BAY WINDOW**

BOW-WOW **THEORY OF LANGUAGE** See **ONOMATOPEIA**

BOX, *Buxus* (Lat *buxus*, from Gk *βύτος*, *pyraos*) A genus of plants of the family Buxaceae, evergreen shrubs or small trees, with opposite leaves, entire at the margins, and with greenish, inconspicuous flowers in little axillary clusters, the male and female flowers distinct, but on the same plant The most important species is the common box (*Buxus sempervirens*), which grows wild in the south of Europe and in some parts of Asia, attaining a height of 20 or more feet, its leaves are oval, generally from half to three-quarters of an inch in length, smooth and shining, of a deep-green color and a compact habit of growth There are several cultivated varieties distinguished by differently variegated leaves—gold-edged, silver-edged, etc Dwarf box grows only to a height of two or three feet and is very commonly used to form borders for garden plots, being kept down by clipping to a height of a few inches The box bears clipping remarkably well and is much used in formal gardens for this purpose The wood of the box is heavy, of a beautiful, pale-yellow color, remarkably hard and strong, of a fine, regular, and compact texture, capable of a beautiful polish, and not liable to be worm-eaten It is much valued for the purpose of the turner and the wood carver, is preferred to every other kind of wood for the manufacture of flutes, flageolets, and other wind instruments, as well as of mathematical instruments, and is unrivaled for wood engraving (See **WOOD ENGRAVING**) Spain, Portugal, Circassia, and Georgia send into the market large quantities of boxwood The Minorca box, or Balearic box (*Buxus balearica*), a native of Minorca, Sardinia, Corsica, Turkey, etc., is a larger tree than the common box The wood is of a bright yellow and inferior to the true boxwood, but is exported in large quantities from Constantinople The earliest known fossil forms of *Buxus* have been found in the Pliocene deposits of France For illustration, see **BEECH**, and Plate of **BIGNONIA**

BOX AND COX. A short farce by John M. Morton. A landlady, Mrs. Bouncer, unknown to both, lets her single room to two men of these names, one of whom works in the daytime, the other at night.

BOX'BER'RY. See GAULTHERIA.

BOX ELDER (*box*, the tree + *elder* or *alder*), or **ASH-LEAVED MAPLE** (*Acer negundo*, or *Negundo aceroides*). One of the hardiest and most widely distributed trees in the United States, ranging from Vermont to Florida, and westward to Utah and Arizona. A form known as *Acer negundo californica* is found in California. In rich river bottoms it often attains a height of more than 60 feet and a diameter of 3 feet. The wood is light and soft and is suitable for woodenware, wood pulp, etc. The box elder is considered a good shade tree, and it has been extensively employed in plantings in the Western States for windbreaks, shade, fuel, etc. It grows rapidly and serves as an excellent nurse tree for other species. In some parts of the Northwestern States sugar is made from the sap. See Plate of BIGNONIA.

BOX'ERS' REBEL'ION. See CHINA.

BOX'FISH. See TRUNKFISH; SWELL.

BOX'HAUL'ING. A method of changing a ship from one tack to the other. It is resorted to when a ship fails to go around (i.e., *misses stays*) while attempting to tack in narrow waters, or on a lee shore, and there is no room to *wear*, and in narrow channels when there is danger of running on shore in tacking. The first part of the manoeuvre resembles tacking; the helm (q.v.) is put down and the ship brought up head to wind with all the sails aback. Her headway is thus quickly checked, the head yards (those on the foremast) are then swung around (i.e., braced *abow*, from which circumstance the manoeuvre takes its name), as if on the other tack, and the after yards (those on the mainmast and mizzenmast) *squared* (i.e., placed athwartship). She now gathers *stern-board* (i.e., starts to sail astern) and continues to back around, turning her stern up into the wind, which operation is facilitated by bracing the after yards like the fore as soon as the wind is abeam. After the wind has passed the stern, the ship gradually gathers headway and comes up to the wind on the new tack, when the operation is completed.

BOX'ING (probably akin to Dan. *bask*, slap, blow, *boske*, to slap, strike). Since the days when fighting with the bare fists was made unlawful, the tendency of the interpretation of the word "boxing" has been to limit its use to exhibitions of skill, and to use the word "pugilism" when referring to professional contests under the old rules and to ancient gladiators. Modern boxing rules, known as the "Queensberry Rules," which govern even professional prize fights, have eliminated the worst features of the pugilism of antiquity and effected a great improvement in modern methods. The ancient method was to make the punishment as cruel as possible by wearing a *cestus* of bronze, several thicknesses of rawhide strongly fastened together and projecting beyond the knuckles, and by binding the wrist and forearm with leather thongs, by these means adding to the capacity of the bare hand to inflict injury. The present custom of wearing a padded glove lessens this capacity. The last remnant of barbarism disappeared from pugilism when wrestling, which played an important part in the contests of the

eighteenth and first half of the nineteenth centuries, was ruled out. How late it lasted is testified by the reports of the historic battles of Mendoza, Bendigo, and Sayers, in which such passages as the following were common: "After a short struggle both men went down, the Tipton Slasher uppermost"; or, "They then closed, and after a short tussle, the Infant threw his man, falling heavily upon him."

How ancient was the practice of pugilism may be gathered from many writings of antiquity. In the roll call at the siege of Troy, Pollux is described as "good with his fists." There are many interesting details of it at the funeral of Patroclus, including the mention of the belt, which is still the emblem of pugilistic championships, and the habit of having such contests as part of a funeral celebration has survived to this day in Siam. Vergil's description of the fight between Dares and the Sicilian Entellus is another classical description of the sport.

Among the English sports of the Middle Ages boxing did not occupy so prominent a place as cudgeling and quarterstaff; and James Figg, whose portrait was painted by Hogarth (and who was supreme between 1719 and 1730), may be considered as the modern father of the "manly art of self-defense." From his time until 1860, when Sayers fought Heenan, the list of champions is unbroken. Up to this period the science of self-defense had made but little progress, and strength and endurance constituted the only recommendations of the practitioners at Smithfield, Moorfield, and Southwark Fair, which had long had booths and rings for the display of boxing. Jack Broughton (1705-89), who occupied the position of "champion of England" from 1784 to 1780, built a theatre in Hanway Street, Oxford Street, in 1740, for the display of boxing; advertisements were issued announcing a succession of battles between first-rate pugilists, who never quitted the stage till one or the other was defeated, the reward of each man being dependent upon and proportioned to the receipts. Broughton was for 18 years champion of England. He propounded some rules for the regulation of the ring which remained in authority till 1838, or nearly a century. They are now spoken of as the "old rules." Rule 1 is, that a square of a yard be chalked in the middle of a stage, and that in every fresh set-to after a fall the seconds are to bring their men to the side of the square and to place them opposite each other; and until this is done, it is not lawful for one to strike the other. Rule 2, that if either of the combatants be unable to be brought up to the square within 30 seconds after a fall and the close of a round, he shall be deemed a beaten man. No man is permitted to hit his adversary when he is down, or to seize him by the breeches, or below the waist, and a man on his knees is to be reckoned down. These rules laid the foundation of fair play. To Broughton also is due the introduction of gloves for "sparring matches," whereby lessons could be taken without injury. The greatest professor of the art was John Jackson (1769-1845) who was champion from 1795 to 1800. He was not only the most scientific boxer of his day, but he gave his art such a prestige and popularity that half the men of rank and fashion of the period were proud to call themselves his pupils. He opened rooms for the practice of boxing in Bond Street,

and for years these were crowded by men of note. His "principles of pugilism" were, that contempt of danger and confidence in one's self were the first and best qualities of a pugilist, that in hitting you must judge well your distances, for a blow delivered at all out of range was like a spent shot, and valueless, that men should fight with their legs, using all possible agility, as well as with their hands, and that all stiffness of style or position was wrong. Jackson is still regarded as one of the best theorists on the art. At this period pugilism was actively supported by many persons of high rank. In 1814, when the Allied sovereigns visited England, among other entertainments, a sparring display was provided under Jackson's management, and the distinguished foreigners expressed much gratification at the exhibition of so much science and fine physical development. Besides Jackson, Belcher, Gully, and Cribb were noted champions at this period, which may be termed the palmy days of the ring. From various causes its decline has since been uninterrupted. The more distinguished patrons gradually withdrew, the Pugilistic Club, which had been established in 1814 and included all the aristocratic patrons of the ring, was broken up. Magistrates set their faces against the lawless assemblies of roughs and pickpockets who latterly formed the greater part of the spectators at prize fights. In 1860, however, the international combat between Tom Sayers, the Englishman, and John Heenan, the American, revived for a moment public interest in the art. This contest was declared a draw, when, after 2 hours and 20 minutes of fighting, the mob rushed the ring and ended the combat. After that prize fights were suppressed in England, and glove contests adopted under the Queensberry rules, which now govern them all the world over. Under these rules wrestling and hugging are prohibited, each round is limited to three minutes with one minute interval, and the time allowed for a fallen man to get up is reduced to 10 seconds. The art thenceforward was vigorously maintained in England by many amateur clubs, among the most important of which was the Amateur Athletic Club, founded in 1886. Tom Sayers retired after the fight with Heenan in 1860, leaving the championship of the world open for competition. Jem Mace, by a series of contests, became entitled to meet J. Allen for it in America in 1870 and defeated him. James Smith became the next champion of England in 1885. He was beaten by Jake Kilrain, of Boston, in 1887, Kilrain becoming the world's heavyweight champion. In 1889 John L. Sullivan, of Boston, defeated Kilrain. This is believed to have been the last contest in the United States under the old rules of the London prize ring. James J. Corbett beat Sullivan in 1892, but was defeated in 1897 by Robert Fitzsimmons, who in his turn was vanquished by James J. Jeffries in 1900 and again in 1902. Jeffries was defeated by Jack Johnson (colored) at Reno, Nevada, in 1910. The art of boxing, as an active and healthy exercise, is likely to be maintained, it is a part of all gymnasium work in the United States, so far as facilities for the exercise are concerned, and it has been taken up by the Amateur Athletic Union, which aims to carry it on as a high-class sport, as distinct from professional pugilism.

In 1911 the New York Legislature enacted a

law (consult Laws of New York for 1911, Chapter 779) authorizing the appointment by the governor of a State Athletic Commission of three members to serve five years, and to have "sole direction, management and control of and jurisdiction over all boxing and sparring matches." This law restricts such contests to ten rounds, prescribes gloves not less than eight ounces in weight, provides that 5 per cent of the total receipts from such exhibitions shall be paid to the State, and requires that they shall be absolutely bona fide competitions. Under this law public boxing matches were resumed, especially in New York City. At about the same time there was a renewal of interest in boxing in Europe, especially in France, where Carpentier and Moreau won recognition as expert pugilists. In December, 1913, at London, Carpentier knocked out in one round the English heavyweight champion, "Bombardier" Wells, who, however, had already been knocked out (in the preceding March) by "Gunboat" Smith, the American sailor, at New York.

On pugilism, consult *Fistiana* (London, 1868), *American Fistiana* (New York, 1876), *Miles, Pugilistica* (3 vols., London, 1863), and for the side of boxing as a sport, O'Reilly, *Ethics of Boxing* (Boston, 1888), Doran, *Self-Defense* (Toronto, 1879), Trotter, *Practical Treatise on Boxing* (Philadelphia, 1900), "Boxing," *Badminton Library* (London, 1886), "Boxing," *Oval Series* (London, 1896), "Boxing," *Spalding's Athletic Library* (New York, published annually), Lynch, *The Complete Amateur Boxer* (London, 1913).

BOXING DAY. A popular term applied to December 26 in England. On that day the gentry were accustomed to give presents, generally of money, to their servants or others of humble life. These presents came to be known as *Christmas boxes*. The custom is, perhaps, traceable to that of the Romans during the season of the Saturnalia (q.v.). A fanciful derivation of the term is to be found in Duntton's *Athenian Oracle* (reprinted by Bell, 4 vols.), London, 1728, but its actual origin is very obscure. The practice has of recent years been regarded as a nuisance and in 1836 was actually legislated against, so far as government employees were concerned. Boxing day is one of the four legal bank holidays, the others being Easter Monday, Whitmonday, and the first Monday in August. Consult Brand, *Popular Antiquities* (ed. by Ellis, 3 vols., London, 1843).

BOXING THE COMPASS. One among many sea phrases whose origin is not easily traceable. It means simply a rehearsal or enumeration of the several points, half-points, and quarter-points of the mariner's compass in their proper order, and is among the lessons which a young sailor has to learn. See COMPASS.

BOXTEL, bôks'tel. A town and important railway junction in North Brabant, Holland, at the confluence of the Beerze and Dommel, 6 miles south of Bois-le-Duc (Map Netherlands, D 3). The church of Saint Peter and the castle of Stapel are the chief buildings. It manufactures damask linens, paper, and salt. In 1794 the French here won an important victory over the Anglo-Dutch army. Pop., 1900, 6743, 1911, 8258.

BOX'THORN', or MATRIMONY VINE. See LYCIUM.

BOX TORTOISE, tór'tis or -tús, or **TURTLE.** See TURTLE.

BOYACÁ, bō'yá-ká'. A department of the Republic of Colombia, South America, bordering upon Venezuela and the states of Santander and Cundinamarca. It covers an area of 16,460 square miles, a large portion of the former area having been incorporated with new departments organized in 1905. In the western part of the old state are Eastern Cordilleras, from which the land slopes east in vast prairies, covered to a great extent with marshes and forests, with scattered pastures and cultivated ground, watered by tributaries of the Orinoco and the Meta. The lowlands are fertile, and among the mountains various minerals are found, and the emerald mines of Muzo have long been famous. The people have rude manufactures of cotton, wool, straw, etc., but cattle raising is the chief occupation. Pop., 380,000. Only a small part of the state is inhabited. The capital is Tunja, of 8500 inhabitants.

BOYACÁ. A town of Colombia, 25 miles south of Tunja in the state of Boyacá, near which in 1819 Bolívar won a victory over the Spaniards, thereby securing the independence of Colombia (Map: Colombia, C 2). Pop., 7000.

BOY AND THE MAN'TLE, THE. A ballad, among those collected by Bishop Percy, which relates that a youth once came to King Arthur's court, bearing a cloak which, he said, only such wiles could wear as had always been faithful.

BOYAR, bō-yār', or **BOJAR** (Russ. *boyarinū*, originally either (1) fighting man, warrior, from *boy*, fight, battle, or (2) great man, for *boyarinū*, from Slav. *bol*, Russ. *bolshoy*, great, grand. The modern Russian form is *barinū*, estate holder, nobleman, master). A word originally of the same meaning as Czech, Lech, and Bolgarin, i.e., free proprietor of the soil. The Boyars in Old Russia were the order next to the kniazes or kniases ('ruling princes'). They formed the immediate "following" of these princes and bore somewhat the same relation to them as the lesser English and Scottish knights of the feudal ages bore to the great barons. They had their own partisans, who served as a kind of bodyguard. They gave their services to a prince of their own choice, whom, however, they left again at their pleasure; and, in consequence of this, the kniazes could secure their allegiance only by the bestowal of privileges. They held exclusively the highest military and civil offices, and the most powerful rulers considered it prudent to use this form of expression in their ukases: "The Emperor has ordered it; the Boyars have approved it." Rank among the Boyars was always proportioned to length of state service and was rigidly observed. This gradation of rank was called *myestintchestvo* (from *myesto*, place at the table during court functions, rank). The institution was peculiar to Slavic life, equally unlike feudalism and modern aristocracy, and must be regarded as a strictly national development. In their housekeeping the Boyars were excessively fond of splendor, and their contempt for the serfs, or "lower orders," was immeasurable. In the lapse of time many Chinese customs—as might be expected from their theory of rank—crept into their public life. Their power, and the respect which was paid them, acted as a wholesome check upon the otherwise unbridled authority of the princes; in consequence of which the latter became their bitter enemies and often sought to destroy their power. This was

finally done by Peter the Great, who abolished the order of Boyars, giving them a place among the Russian nobility, but stripping them of their peculiar privileges. The last Boyar, Kniaz Ivan Yuryevitch Trubetskoy, died Jan. 16, 1750. In Rumania Boyars still exist. Consult: Rambaud, *History of Russia*, Eng. trans., by Well (London, 1887); Wallace, *Russia* (2d ed., New York, 1905).

BOY BISH'OP. The custom of electing a boy bishop on St. Nicholas' Day dates from a very early period. In England it seems to have prevailed in many parishes. The election took place on St. Nicholas' Day (December 6), and the authority lasted until Holy Innocents' Day (December 28). The boy bishop was usually chosen from the children of the church or cathedral choir, but the custom also prevailed in the schools of Winchester and Eton. He was arrayed in episcopal vestments and, attended by a crowd of subordinates in priestly dress, went about with songs and dances from house to house, blessing the people. The boy bishop was supposed to exact implicit obedience from his fellows, who with their superior took possession of the church and performed all the ceremonies and offices except mass. The custom found countenance not among the populace only. In 1299 it is said that Edward I., on his way to Scotland, permitted a boy bishop to say vespers before him at Heton, near Newcastle-on-Tyne, and gave him and his companions a present. At Salisbury, and perhaps in other places also, the boy bishop—so it is said—had the power of disposing of such prebends as happened to fall vacant during the days of his episcopacy; and if he died during his office, the funeral honors of a bishop, with a monument, were granted him. In England the custom of electing a boy bishop was abolished in the reign of Elizabeth, though it seems to have lingered here and there in villages till about the close of her reign. Consult Walcott, *Sacred Archaeology* (London, 1868).

BOY'COTT, BOY'COTTING. A conspiracy to punish or coerce any one by inducing others to abstain from business or social relations with him. A species of organized ostracism. It derives its name from a conspicuous victim of the practice, Captain Boycott, an Englishman, who was land agent of Lord Erne in the district of Connemara, Ireland, in 1881. He incurred the ill will of the tenantry by his harsh enforcement of the law in the eviction of tenants for nonpayment of rent. As a consequence they induced the population for miles around to refuse to have anything to do with him or his family. He was reduced to dire straits and was finally obliged to leave the country.

The boycott is not infrequently employed in trade disputes by combinations of working men or trades unionists to injure the business of an obnoxious employer with the view of forcing him to accede to the demands of his employees or of the trades unions, or of punishing him for his refusal so to do. It has generally been held that this form of coercion, if employed for a lawful purpose, as to secure a rise in wages or better working conditions or generally to improve the condition of the working classes, and if carried on without violence or other acts in themselves unlawful, is not an illegal conspiracy; in other words, that "peaceful" boycotting, no matter how much injury it may inflict on the victim, is not forbidden by law.

This is the doctrine of the English courts, and it has been affirmed by Parliament in the Trade Disputes Act (6 Edw VII, c 47, 1906). In many of the United States the contrary view has, however, been taken, and it is there held that a boycott, even when unaccompanied by violence or intimidation, is unlawful, and in some States it is prohibited by statute. When employed for an improper purpose, as merely to injure an obnoxious person, or when accompanied by violence or other unlawful act, boycotting is everywhere unlawful and subjects the offenders to an action for damages as well as to indictment and punishment by the criminal law.

Consult articles by Jeremiah Smith, "Crucial Issues in Labor Litigations," *Harvard Law Review*, vol. xx, pp. 253, 345, 429 (1907), and by O W Holmes, "Privilege, Malice, and Intent," *ib*, vol. viii, p 1 (1893), and see COMPETITION, CONSPIRACY, INTIMIDATION, TRADES UNIONS.

BOYD, ANDREW KENNEDY HUTCHISON (1825-99) A Scottish divine and author, born at Auchmleck, in Ayrshire. He studied at King's College and at the Middle Temple in London, and took his bachelor's degree at Glasgow (1846). Licensed to preach in 1850, he became in 1851 minister of Newton-on-Ayr. In 1859 he gained a wide reputation for his *Recreations of a Country Parson*, contributed to *Fraser's Magazine*, and in the same year was appointed to St Bernard's, Edinburgh, in 1865 becoming minister at St Andrews. For the part he played in literature and in the Church councils he was soon the best known among the Scottish divines of his day. *The Recreations of a Country Parson* (1859, 1861, 1878) appeared in three series. He published an extremely interesting series of autobiographical sketches bearing the titles *Twenty-five Years of St Andrews* (1892), *St Andrews and Elsewhere* (1894), *Last Years of St Andrews* (1896). Among his other publications are *Graver Thoughts of a Country Parson* (1862), *Autumn Holidays of a Country Parson* (1864), *Critical Essays of a Country Parson* (1865), *East Coast Days and Memories* (1889).

BOYD, SIR JOHN ALEXANDER (1837-) A Canadian jurist, born in Toronto, and educated at Upper Canada College and Toronto University. He was admitted to the bar in 1863 and came to be recognized as one of its ablest equity pleaders. In 1881 he was appointed Chancellor of Ontario, and in 1887 president of the High Court of Justice for that province. He served also as arbitrator for the Dominion government in the adjustment of certain claims made against it by the Canadian Pacific Railway and in 1902 arbitrated the differences between this road and its trackmen. He was also a member of various royal commissions. One of the ablest of Canadian judges, he became distinguished for decisions swiftly reached, clear, impartial, and models of style. In 1901 he was knighted.

BOYD, JOHN PARKER (1764-1830) An American soldier, born at Newburyport, Mass. He entered the United States army in 1786, went in 1789 to India, and there organized a small mercenary force, retained in the service of various native princes. Having returned to the United States in 1808, he was in the same year appointed colonel of the Fourth Infantry, and in 1811 distinguished himself at the battle of Tippecanoe. During the War of 1812, with

the rank of brigadier general, he was notably prominent at the capture of Fort George, Canada, and at Chrysler's Field. He published a pamphlet, *Documents and Facts Relative to Military Events during the Late War* (1816), containing the text of a memorial communicated to the War Department in protest against his nonretention as an officer in the peace establishment. Just before his death he was appointed naval officer at Boston by President Jackson.

BOYD, ZACHARY (1585-1653) A Scottish divine. He was born at Penkill, Ayrshire, Scotland, about 1585, was educated at Kilmarnock, and studied at the universities of Glasgow and St Andrews and the Protestant College of Saumur in France, of which latter he was in 1611 appointed a regent or professor and is said to have declined the principalship. The persecutions of the Protestants in France caused him to return to Scotland in 1623, and he became minister of the Barony Parish, Glasgow, and was thrice elected rector of the university of that city. His principal prose work, *The Last Battell of the Soule in Death*, was published at Edinburgh in 1629, in 2 vols. He was author of 18 other works, chiefly of a religious cast. His *Bible Songs* and his *Psalmes of David in Meter* appeared at Glasgow in 1648. He died in 1653, leaving numerous manuscripts and his library, with a considerable legacy, to the University of Glasgow, and his bust is now preserved in its library. Among his manuscripts is a collection of quaint poems on scriptural subjects, entitled *Zion's Flowers*, usually called Zachary Boyd's Bible. Gabriel Neil reprinted at Glasgow, in 1831, Boyd's *Last Battell*, and published a life of Boyd, in 1855, with four poems from *Zion's Flowers*. *Four Letters of Comforts for the Deaths of the Earle of Hadningtown and of the Lord Boyd*, originally 1640, were reprinted in facsimile at Edinburgh, 1878.

BOYD-CARPENTER, SIR WILLIAM See CARPENTER, SIR WILLIAM BOYD.

BOYDELL, JOHN (1719-1804) An English etcher and publisher of prints. He was born at Dorrington, Shropshire, Jan. 19, 1719, studied etching with W H Towns in London, and attained a certain proficiency in the art. But he is best known as a publisher of the prints of others. The works of British engravers, through his patronage, rose to such a high degree of excellence that they were sought after by all Europe, and the importation of foreign prints at that time in a great measure ceased. He then directed his attention to the art of painting, undertaking to illustrate Shakespeare from the works of English artists. In bringing this project to completion he expended £30,000, and no less than 170 pictures were required. His Shakespeare Gallery was ready for the public in 1789, but the Napoleonic wars destroyed his foreign trade and brought him into such financial straits that in 1804 he obtained permission from the Parliament to sell all his artistic property by lottery, but Boydell died before the lottery was held. In 1782 he was elected alderman and in 1790 Lord Mayor. At a Royal Academy dinner in 1789 Sir Joshua Reynolds toasted him as the "commercial Mæcenas of England."

BOYDEN, SETH (1785-1870) An American inventor, born in Massachusetts. He invented a machine for splitting leather and a process for making spelter. In 1826 he made

the first malleable cast iron. Among his other inventions was one for making hat bodies, and a process for making Russia sheet iron. He built the first successful locomotive that had the cylinders outside of the frame, and with the "cut off" instead of the throttle valve. His later years were spent in farming in New Jersey, where his ingenuity manifested itself by developing new varieties of strawberries.

BOYD'S. The courtyard in front of the White Horse Inn, where Dr. Johnson alighted on his first arrival in Edinburgh, as narrated by Boswell. It has since been swept away to make room for modern houses and streets.

BOYE, bô'ye, CASPAR JOHANNES (1791-1853). A Danish preacher and poet, born at Kongsberg, Norway. He studied theology in Copenhagen, was pastor of various parishes, and from 1847 in Copenhagen. He was known as a translator of Walter Scott, but established a reputation, first anonymously, by his dramas, the best of which are the three tragedies, *Juta* (1823), *Svend Grathe* (1824), and *Erik den Syvende* (1827). In Danish literature his rather sentimental works stand between the more healthy and vigorous Oehlenschläger and early modern realism. Selections from his poetic works appeared at Copenhagen (4 vols., 1850-51).

BOYEN, bô'yen, HERMANN VON (1771-1848). A Prussian field marshal. He was born at Kreuzburg, East Prussia, and was descended from an ancient noble family of Bohemia. In 1809 he entered the War Department of the Prussian government, where he counseled the abolition of the militia system and the introduction of general military duty. As director of the War Department he acted as the confidential adviser of the king from 1810 to 1812. He was afterward appointed Prussian Minister of War, in which capacity he introduced the law of compulsory military service (Sept. 3, 1814). From 1819 he lived in retirement for 21 years, then reëntering active service as general of infantry and in the following year becoming again Minister of War. Upon his second retirement in 1847 he was raised to the rank of field marshal. His services in behalf of Prussia were recognized in an address by Emperor William I to the senior members of the Order of the Iron Cross, March 31, 1871. The Emperor said: "Recognizing that we have only built upon the foundations laid in 1813, 1814, 1815, we should fitly appreciate the splendid services of the men of that epoch, and notably those of Boyen."

BOYER, bô'wâ'yâ, ALEXIS, BARON DE (1757-1833). A French surgeon. He was a barber surgeon's apprentice, then studied medicine, and soon won recognition. In 1787 he was appointed second surgeon to the Hôpital de la Charité at Paris, and afterward was professor, first of operative surgery and then of clinical surgery, at the Ecole de Santé. In 1804 he was appointed first surgeon to Napoleon. After the Restoration Boyer became professor of practical surgery in the University of Paris and first surgeon at the Hôpital de la Charité. In 1823 he was appointed consulting surgeon to the king and in 1825 was admitted a member of the Institute. His best-known works are his *Traité complet d'anatomie* (4 vols., 1797-99) and *Traité des maladies chirurgicales et des opérations qui leur conviennent* (11 vols., 1814-26; new ed., 7 vols., 1844-51).

BOYER, JEAN BAPTISTE DE. See ARGENS, MARQUIS D'.

BOYER, JEAN PIERRE (1776-1850). A general and President of the Republic of Haiti. He was a mulatto. He was born at Port-au-Prince, received a European education, and in 1792 entered the military service. After his return to Haiti he joined the blacks, who had risen against the French. After the commissioners of the French Convention had proclaimed the freedom of the blacks in Haiti (1793), he fought with the mulattoes against the negroes and with the negroes against the English. He was compelled to flee to France, but returned with General Leclerc in 1802. After the French had been expelled, and negro domination established, Boyer united with Pétion and Christophe to overthrow Dessalines, the negro despot; but when Christophe made himself Emperor, Pétion established an independent republic in the southwestern part of the island, and Boyer became Governor of Port-au-Prince, and the firmest adherent of the new commonwealth, which he defended against the troops of Christophe. Upon the death of Pétion, in 1818, Boyer was unanimously elected President. Within three years he brought the entire island under his rule, and in 1825 obtained from France the recognition of the Haitian Republic. At first the country improved under his administration, but power corrupted him. His cruel and arbitrary conduct aroused great discontent, and the imposition of oppressive taxes necessitated by the payment of an indemnity of 150,000,000 francs to France stirred up an insurrection in 1843. Boyer fled to Jamaica, and, after the Revolution of 1848, retired to France, where he died. See HAITI.

BOYËSEN, HJALMAR HJORTH (1848-95). A Norwegian-American novelist and littérateur. He was born at Fredriksvern, Norway, Sept. 23, 1848, and studied in Christiania and in Leipzig. In 1869 he came to America, edited the *Fremad*, a Scandinavian journal, in Chicago, became professor of German at Cornell (1874-80), and held a professorship in Columbia University, New York, from 1880 till his death. He acquired a facility in English remarkable in a foreigner, and within six years of his emigration had achieved popularity in English prose and verse. His more noteworthy works of fiction are: *Gunnar, a Norse Romance* (1874); *Tales from Two Hemispheres* (1874); *Falconberg* (1878); *Ilka on the Hilltop* (short stories, 1881); *Queen Titania* (1881); *A Daughter of the Philistines* (1883); *Social Struggles* (1884); *The Golden Calf* (1892). His critical essays are contained in *Goethe and Schiller: Their Lives and Works* (1878); *Literary and Social Sketches; Essays on Scandinavian Literature; and Essays on German Literature*. His poems are gathered in *Idylls of Norway* (1882). He also wrote negligible juveniles. As a popular lecturer he was in great demand. *Ilka on the Hilltop* was dramatized in 1884, and a play of his called *Alpine Roses* was produced in the same year. He died, suddenly and alone, in New York, Oct. 5, 1895.

BOYLE. A town in Roscommon Co., Ireland, picturesquely situated in a valley on both sides of the Boyle, 1 mile above Lough Key, and 8 miles northwest of Carrick-on-Shannon (Map: Ireland, C 3). It is noted for its well-preserved Cistercian abbey (1161), of considerable architectural interest, and is a favorite angling centre. It has a large grain and butter trade. Latin and English annals of Boyle, dating from

420 to 1245, have been published. Pop., 1901, 2477, 1911, 2691

BOYLE, BERNARDO See **BOIL, BERNARDO**

BOYLE, CHARLES, fourth EARL OF ORRERY (1676-1731). An English soldier and physicist. He was born at Chelsea, was educated at Christ Church, Oxford, succeeded to his title in 1703, fought at Malplaquet, was made major general, and received several court appointments. He died Aug. 28, 1731. After him was named the astronomical instrument known as the "Orrey." Boyle is chiefly remembered for the part he took, while a student, in the controversy over the antiquity of the *Epistles of Phalaris*. He was silenced by Richard Bentley. The literary quarrel led to Swift's *Battle of the Books*. Of his poems, Sir Richard Blackmore said

"After his foolish rhymes, both friends and foes
Conclude they know *who did not write his prose*."

See **BATTLE OF THE BOOKS**

BOYLE, DAVID (1842-1911). A Canadian ethnologist. He was born in Greenock, Scotland, and was educated there and at St. Andrew's School, Birkenhead, England. In 1856 he went to Canada with his parents, and within a few years began teaching. While principal of the public school at Elora, his researches in the geological formation of the district led to the discovery of important fossils, named after him "Murchisonia Boylei." His archaeological researches resulted in a valuable collection, chiefly Indian relics, which was presented to the Canadian Institute, Toronto, and was the basis of its archaeological museum. He had charge of the Ontario mineral exhibit at the Cincinnati Centennial Exposition (1888), and also at the Imperial Institute, London (1892), and the Columbian Exposition (1893). He was appointed superintendent of the Education Department Museum, Toronto, in 1901. In recognition of his attainments he was chosen a member of various learned societies in Europe and America. He published *Notes on the Life of Dr. Joseph Workman* (1894), *Notes on Primitive Man in Ontario* (1895), *The History of Scarborough, 1796-1896* (1896), and *Uncle Jim's Canadian Nursery Rhymes* (1908).

BOYLE, JOHN, EARL OF CORK AND ORRERY (1707-62). An Irish writer. He is best known for his strangely unappreciative and malicious *Remarks* (1751) on his dead friend Swift and for his excellent rendering into English (1751) of the *Epistolæ* of Pliny the Younger.

BOYLE, RICHARD (1566-1643). The founder of the house of Cork and Orrery, and styled the "great Earl of Cork," was born at Canterbury, England. He was educated at Bennet's (Corpus Christi) College, Cambridge. At the age of 22 he went over to Ireland, where he afterward bought estates and improved them, promoted the immigration of English Protestants, and triumphed over his accusers and enemies through the intervention of Queen Elizabeth. In 1616 he was made Baron Youghal and in 1620 became Viscount Dungarvan and Earl of Cork. In 1631 he was made Lord High Treasurer, an office which remained hereditary in his family. In his old age he suppressed a rising of Munster rebels.

BOYLE, ROBERT (1627-91). An English physicist and chemist. He was the son of the first Earl of Cork and was born at Lismore Castle, Waterford, Ireland, Jan. 25, 1627. As a child, he was distinguished by precocity of in-

tellect and a rare love of truth. After studying at Eton and at home, he went to the Continent, where he stayed for six years (1638-44). On his return he found himself in possession, by his father's death, of the manor of Stalbridge, Dorsetshire, where he resided till 1650. He took no part in political strife, but devoted himself to the cultivation of science, and particularly of chemistry and natural philosophy. He was one of the first members of that association of scientific men which about that time (1645) held private meetings at Oxford and London and some years after became better known as the Royal Society. In 1654 he settled at Oxford. Here he experimented extensively in pneumatics and improved the air pump. At the same time he devoted considerable study to theology. After the Restoration he was urgently advised by Lord Clarendon to take orders, but he thought that he could do better service to religion as a layman. Among the proofs which he gave of this, besides his own theological writings and eminent example, were his exertions as Governor of the Corporation for the Spread of the Gospel in New England, as well as in procuring and circulating at his own expense translations of the Scriptures, and his bequest for the foundation with £50 of the "Boyle Lectures" (qv) in defense of Christianity. In 1668 he took up his residence permanently in London and was thenceforth able to devote much of his time to the business of the Royal Society. In 1680 he was chosen president, but declined the honor. A peerage had repeatedly been offered to him and declined. In 1688, finding his health failing, he shut himself up against all interruption, in order to husband his remaining time for the labor of repairing the loss caused by the accidental destruction of his manuscripts. In 1689 his failing health induced him to lessen his activities in various directions, and on Dec. 30, 1691, he died in London. Boyle was tall and emaciated in person and extremely temperate in his habits, often subject to low spirits, but naturally lively and of rare conversational powers. His scientific reputation was unrivaled among his contemporaries, who regarded him as the successor to Bacon's primacy in such matters. His work in science is fully discussed under **CHEMISTRY**. See also **BOYLE'S LAW**. Boyle's style in writing was verbose. His complete works (including his very interesting correspondence), with a life by T. Birch, and an index, were published in 5 vols. (London, 1744, 6 vols., 2d ed., 1772). For his life, see Muir (New York, 1911).

BOYLE, ROGER (1621-79). An English soldier, statesman, and author. He studied at Trinity College, Dublin, and was at first a partisan of Charles I, but subsequently served under Cromwell, of whose Privy Council he became a member. After Cromwell's death he gained control of Ireland for Charles II and upon the Restoration was made Earl of Orrery. He wrote *Parthenissa* (1665-67) and *A Treatise of the Art of War* (1677), besides several plays and a large number of poems.

BOYLE LECTURES. An annual course of lectures delivered at St. Mary-le-Bow Church, London, so called from the founder, the Hon. Robert Boyle (qv), who settled an annual salary of £50 charged upon his dwelling house in St. Michael's, Crooked Lane, London, for "some preaching minister," who shall preach eight sermons in the year for proving the

Christian religion against atheists, deists, pagans, Jews, and Mohammedans, not descending to any controversies among Christians themselves. Archbishop Tenison procured a yearly salary of £50 to be charged upon a farm at Brill, Bucks, instead of the original charge for the endowment. The office is tenable for three years.

The first series of lectures, *A Confutation of Atheism*, was preached in 1692 by Richard Bentley (q.v.). In 1704 Dr. Samuel Clarke preached the lectures, entitled *A Demonstration of the Being and Attributes of God*, in answer to the arguments of Hobbes, Spinoza, and their followers. All the lectures preached up to 1732 were collected into a fine folio edition, in 3 vols. (London, 1739); since that period, till recently, few of the lectures have been published, but among them may be mentioned: F. D. Mauries, *The Religions of the World* (1846; 4th ed., 1862); C. Merivale, *The Conversion of the Roman Empire* (1864); *The Conversion of the Northern Nations* (1865); E. H. Plumptre, *Christ and Christendom* (1866); J. A. Hessey, *Moral Difficulties Connected with the Bible* (3d series, 1871-73); H. Wace, *Christianity and Morality* (1874; 5th ed., 1882); W. C. E. Newbolt, *The Gospel of Experience; or, the Witness of Human Life to the Truth of Revelation* (1895).

BOYLE'S FUMING LIQUOR, or VOLATILE LIVER OF SULPHUR. A mixture of various ammonium polysulphides. It is obtained in the form of a dark yellow, strongly fuming liquid with a pungent odor of hydrogen sulphide, by distilling a mixture of 1 part of sulphur, 2 parts of ammonium chloride, and 3 parts of lime.

BOYLE'S LAW. A law of physics formulated by Robert Boyle, which states that when a gas is at a constant temperature the product of the pressure and volume of a given mass remains constant. The same discovery was also made by the French physicist Mariotte, and the law is sometimes called Mariotte's Law, or the Law of Boyle and Mariotte. See ELASTICITY; HEAT; CRITICAL POINT.

BOYLSTON, boyl'ston, ZABDIEL (1680-1766). An American physician, born in Massachusetts. He was the earliest advocate in the United States of inoculation for smallpox, but the whole profession opposed him, and a law, afterward repealed, was passed against the practice. He secured the support of several prominent ministers, however, and the practice gradually became general in New England. He wrote several pamphlets on inoculation and several papers in the *Philosophical Transactions of London*. Consult an article, "Zabdiel and John Boylston," in vol. xxxv of the *New England Historical and Genealogical Register* (1881).

BOYNE, boin (Ir. *Boinn*). The most important river in the east of Ireland, rising in the Bog of Allen, and flowing through Kildare, King's Co., Meath, and Louth (Map: Ireland, E 3). It passes Trim, Navan, Slane, and Drogheda, and enters the Irish Sea 4 miles below the last town, after a course of over 70 miles, its total descent being 336 feet. Its chief tributaries are the Deel, Mattoch, and Blackwater. It is navigable for vessels of 250 tons to Drogheda and for barges of 70 tons to Navan, 19 miles up. Sand bars prevent large vessels from entering the river. Turgesius, the Dane, sailed up the Boyne in the year 838 and plundered

Meath. It is chiefly famous for the battle of the Boyne (q.v.), which took place on its banks near Drogheda in July, 1690. Consult Wilde, *The Beauties of the Boyne and the Blackwater* (Dublin, 1869).

BOYNE, BATTLE OF THE. A battle fought on July 11 (new calendar; July 1, old style), 1690, 3 miles west of Drogheda, on the banks of the Boyne, Ireland. This battle was fatal to the cause of James II and assured the ascendancy of Protestantism in England. The troops of James, 30,000 in number, were defeated with a loss of 1500 by the forces of William III (James's son-in-law), who had about the same number of men, but lost only about 500. An obelisk, 150 feet high, marks the scene of the battle. For the bitter feeling among the Irish which followed this battle, see ORANGEMEN. The anniversary of the battle of the Boyne is celebrated on July 12.

BOYNE CITY. A city in Charlevoix Co., Mich., 181 miles by rail north of Grand Rapids, at the mouth of Boyne River, at the head of Pine Lake, and on the Boyne City, Gaylor, and Alpena Railroad (Map: Michigan, D 3). Boyne City has a splendid natural harbor and carries on a considerable trade in fruit, sole leather, and hard wood. It has railroad repair shops, foundries, a tannery, a cooperage, flooring, and veneering plant, and manufactures handles, chemicals, and clay products, and extracts. The water works are owned by the municipality. Pop., 1900, 1912; 1910, 5218.

BOYNTON, HENRY WALCOTT (1869-). An American author, born in Guilford, Conn. He graduated from Amherst College in 1891 and thereafter was head of the English department at Phillips Andover Academy for several years. Much of his best work was done as a book reviewer, notably for the *Atlantic Monthly* in 1901-04 and afterward for the *New York Times*. He edited many texts for secondary-school use and a valuable one-volume edition of Pope's *Poetical Works* (1902); wrote brief biographies of Washington Irving (1901) and Bret Harte (1903); *Journalism and Literature, and other Essays* (1904); *A Reader's History of American Literature* with T. W. Higginson (1903); and *The World's Leading Poets* (1912).

BOYRON, MICHAEL. See BARON, MICHAEL.

BOYS, SHIPS'. In nautical language, all the young or green hands on board, so called without much reference to their age. In recent times arrangements have been made to give a more precise meaning to the term by engaging boys or lads as part of the crew. There has been no such rating in the United States navy since the establishment of the apprentice system, but it is still preserved in the British navy.

BOYS' CLUBS. A term applied to organizations maintained by adults on behalf of boys. The spontaneous organizations formed by boys are also occasionally called clubs. An investigation, made by Dr. H. D. Sheldon in 1898, of 862 clubs formed by American boys between the ages of 10 and 17, revealed the following as to their purpose: 23 were secret societies, 28 social ("good times"), 56 industrial, 10 philanthropic, 28 literary, art, and musical, 105 predatory (hunting, fighting, preying, etc.), 379 athletic and game clubs. The majority of these were started by boys of the ages 11, 12, 13, the numbers being (11) 155; (12) 164; (13) 188. Eighty-seven per cent of the clubs were formed by boys between the ages of 10 and 15,

while 85½ per cent stood for physical activity. It was found that interest in athletic organizations increased to the thirteenth year, then rapidly diminished, while interest in literary societies, etc., increased with maturity. Boys and girls seldom joined in forming clubs. A more detailed investigation of 66 boys' "gangs" by J. Adams Puffer, showed somewhat similar results. Eighty per cent included group games among their activities, 74 per cent, "tribal industries" (hunting, fishing, building huts, etc.), 74 per cent, stealing and injuring property, 70 per cent, fighting.

Boys' clubs promoted by adults represent an endeavor to utilize to better purpose the instincts that lead boys to band together. In all such clubs an attempt is made to provide wholesome amusement, especially in the form of gymnastic exercise and outdoor sports, to establish standards of honesty and discipline. To supplement the work of the public schools in creating an interest in good reading is also a common object of such clubs. Religious instruction plays a large part in many of the organizations. The earlier clubs, many of which were founded in the last quarter of the nineteenth century, were large, numbering their members by hundreds. In some cities large club buildings have been erected. Such clubs are still the prevailing type in England. Especially in Manchester, clubs of 500 members or more thrive. Such organizations have been criticized, perhaps too severely, on the ground that the boys do not come into intimate contact with the leader. Another type of club came into existence with the social settlements, the first of which in the United States was started in 1889. The clubs are small (8 to 12 members) and hold regular meetings once or twice a week, the programme being varied to suit the boys' interests, or individual clubs take up specific courses. The boys are usually of one locality and often are friends. Thus they are interested in one another, and the leader has a chance to come into close contact with them all. Both types exist in American cities, but in this country the tendency is toward the small clubs. It is estimated that nearly 100,000 boys in America, and 25,000 in England, are members of boys' clubs. Consult Johnson, "Rudimentary Society among Boys," in *Johns Hopkins University Studies*, 2d series, No. 11 (Baltimore, 1884), Sheldon, "The Institutional Activities of American Children," reprint (Worcester, 1899) from *American Journal of Psychology*, vol. ix, Johnson, *Games and Play*, Social Work Monographs (Boston, 1898), Forbush, *How to Help Boys* (Boston, 1900), ib, *The Boy Problem* (Boston, 1901), Newman, *The Boys' Club in Theory and Practice* (London, 1900), Buck, *Boys' Self-Governing Clubs* (New York, 1903), Russell and Rugby, *Working Lads' Clubs* (London, 1908), Swift, *Youth and the Race* (New York, 1912), Forbush, *The Coming Generation* (New York, 1912), Puffer, *The Boy and his Gang* (New York, 1912).

BOY SCOUTS. A movement started for the general purpose of training boys between 12 and 18 in self-reliance, manhood, and good citizenship. It was begun in England in 1908 by General Sir Robert S. S. Baden-Powell, who was impressed by the fact that 45 per cent of the boys of England were growing up without any knowledge of useful occupations. The idea at once received popular support in England, and within two years and a half from the foundation of

the first society 150,000 boy scouts had been enrolled.

In the United States there were at this time two organizations founded for the general purpose of upbuilding the character of boys by grounding them in the principles of good morals and instructing them in useful occupations. One of these organizations was founded by Ernest Thompson Seton and was called Woodcraft Indians, and the other, founded by Dan C. Beard, was called the Sons of Daniel Boone. In 1910 these organizations were combined under the general title Boy Scouts of America and chartered under the laws of the District of Columbia Feb. 8, 1910.

The aim of the Boy Scout movement is in general to supplement the various existing educational agencies and to promote the ability of boys to do things for themselves and for others. The method is made up in the term called "scoutcraft," and is a combination of observation, deduction, and handiness. It includes first aid, life-saving, tracking, signaling, cycling, nature study, seamanship, and other instruction. Each body of scouts, which is known as a patrol, selects a leader from among its own members. Several patrols are combined in a troop, and for these is appointed a scout master who is the leader of the troop. The scout master must be a person of influence and possess qualities which boys respect. Before he becomes a scout a boy must take the scouts' oath, which is as follows: "On my honor I promise that I will do my best, 1st, to do my duty to God and my country, 2d, to help other people at all times, 3d, to obey the scout law." The scouts are divided into three classes—tenderfoot, second-class, and first-class scout. Passing from the tenderfoot class to the second and first class, the boy must pass certain tests. The test for a first-class scout includes the ability to swim 50 yards, the possession of at least two dollars in a savings bank, signaling, the ability to go on foot or to row a boat well to a point seven miles away and return, the ability to describe or show the proper means of saving a life in case of accidents of various kinds, the ability to cook satisfactorily a prescribed variety of dishes, the ability to read a map correctly and draw an intelligent rough sketch map, the ability to use an ax for felling or trimming light timber, the ability to judge distance, size, numbers, and height within 25 per cent of error. The rules of conduct of the scouts are described in the scout law. These prescribe honor, loyalty, unselfishness, friendliness, hatred of snobbishness, courtesy, kindness to animals, obedience to parents, gentleness, and thrift. Although the organization is on military lines, the Boy Scout movement is a non-militant one. A prescribed uniform is worn, and medals are given for faithful services.

At the end of 1913 there were about 8000 scout masters representing as many organizations. The approximate membership of the Boy Scouts of America at that date was 300,000. In the latter part of 1911 and the first part of 1912 Sir Robert Baden-Powell visited the United States and lectured on the Boy Scout movement.

The Boy Scout movement has received the general support of all the religious denominations and other social and economic bodies. The honorary president of the Boy Scouts of America is President Woodrow Wilson, honorary vice presidents, William H. Taft and Theodore Roosevelt, President, Cohn H. Livingstone, Chief Scout,

est Thompson Seton; and National Scout Commissioner, Daniel Carter Beard.

Kindred organization known as the American Scouts was organized in May, 1910. The name was later changed to the United States Scouts. It is chiefly local in New York.

BOYSSET, bwa'sá', CHARLES (1817-1901). French legislator, born at Châlons-sur-Saône, entered the Legislative Assembly after the revolution of 1848 and served until 1851, when was banished in consequence of the coup d'état. In 1867 he returned to Paris and in 1870 was commissioned to organize the national guard in the departments of Côte-d'Or and Maine-et-Loire. He became a member of the Radical Republican party in the Chamber of Deputies, where he proposed such measures as the separation of church and state and the abrogation of the protectionist laws. He published the known *Catéchisme philosophique du XIX^e siècle* (1868) and collaborated with Proudhon *Le Peuple*.

BOYTHORN, LAWRENCE. In Dickens's *the House*, a character supposed to represent the Savage Landor.

BOZ. The pen name of Charles Dickens in a set of papers now known as *Sketches by Boz*, which appeared in book form in 1836. The number to which this name was signed appeared in the *Monthly Magazine* for August, 1836. Dickens's own explanation is interesting: "Boz" was the nickname of a pet child, a younger brother (Augustus), whom I had dubbed Boz in honor of the Vicar of Wakefield; which he facetiously pronounced through the nose as Bozes, and being shortened became Böz, usually the "o" came to be pronounced short, Böz is now correct. The *Pickwick Papers* appeared ascribed to "Boz."

OZEMAN, böz'man. A city and the county of Gallatin Co., Mont., 98 miles southeast Helena, on the Gallatin River and on the Northern Pacific, and the Chicago, Milwaukee, and St. Paul railroads (Map: Montana, E 4). Ozeman is the seat of the State College of Agriculture and Mechanic Arts, opened in 1893, and contains a public library and fine county and municipal buildings. It is in a region which has valuable deposits of coal, onyx, and building stone, and is the headquarters of large agricultural and stock-raising interests. The industrial establishments include flour mills, lumber mills, elevators, a brewery, and a foundry. A line some 20 miles in length has been constructed to serve both for irrigation and as an artery. The water works are owned by the city.

Pop., 1890, 2,143; 1900, 3,419; 1910, 5,107.
OZEN, or **BOZEN**, bö'tsen (It. *Bozano*). A town of the Austrian crownland of Tirol, situated about 800 feet above sea level, at the junction of the Taffer and the Eisach, about 83 miles south of Innsbruck (Map: Austria, B 3). It is well built, and protected from inundations by the Taffer by a strong wall about 2 miles in length, which at the same time serves as a pleasant promenade. The houses for the most part are built in the Italian style, many of them with arcades. The chief public buildings are the town hall, the Gothic parish church, and the Franciscan Monastery, the latter two dating from the fourteenth and fifteenth centuries. Its situation on the Brenner Railway and at the junction of the roads from Germany, Italy, and Switzerland, makes Bozen the busiest commercial

town in Tirol. Its trade is chiefly in fruit and wine, the latter being known as early as the seventh century. There are factories for the canning of fruit and vegetables. Bozen is supposed to occupy the site of the ancient Roman Pons Drusi. Adjoining Bozen, on the opposite side of the Taffer River, is the popular winter resort of Gries. It came into the possession of Austria in 1531. Pop., 1910, 24,126.

BOZ'RAH. The name of two biblical cities—one a city of Edom, the other of Moab. 1. Bozrah, the capital of Edom (Gen. xxxvi. 33; Isa. xxxiv. 6, etc.). This city seems to be identical with El-Buseireh, north of Petra and southwest of Tafilah, in the district of Jebel. Amos (i. 12) predicts the destruction of this city in his prophecy of the doom of Edom, and it is also mentioned in Jer. xlix. 13, 22. 2. Bozrah of Moab, mentioned in the prophecy of the doom of Moab in Jer. xlviii. 24, has not been certainly identified. It may be Bosrah esh-Sham, in the district of Hauran (Auranitis), the Bostra of the days of Trajan. This place is a vast collection of ruins, about 76 miles south-southeast of Damascus. In 100 A.D. the city was restored and beautified by Trajan, who made it the capital of the province of Arabia. In the reign of Alexander Severus it was made a colony, and later it was the seat of a bishopric and of an archbishopric. During the Crusades it was held by the Mohammedans, and all attempts of the Crusaders to capture it were futile.

BOZZARIS, bö'tsä-räs; popularly, bö-zä-räs, Marco or Marcos Bozzaris (c.1790-1823). The "Leonidas of Modern Greece." He was born at Sulis, in the mountains of Epirus, about 1790. After the Treaty of Tilsit, in 1807, he entered the French service, but in 1821 he threw himself into the Greek struggle for liberation, and at the head of a band of Suliotas took an active part in the engagements with the Turks, winning many victories. In 1822 he was defeated at Petta (in company with Prince Mavrocordatos), chiefly through treachery, and both the patriot leaders were obliged to take refuge at Missolonghi. This place valiantly held out until relieved by a Hydriot fleet. In 1823 in anticipation of an assault which he knew the fortifications of Missolonghi were too weak to withstand, he made a sudden sally upon the Turks during the night of August 20, at Karpenisi. The Turkish army was so far superior that its van alone was many times larger than the attacking party; but the Greeks threw the Turks into utter confusion and won a complete victory. The triumph was saddened by the loss of the heroic Bozzaris, who fell while leading on his men to the final attack. This battle has been made the subject of a poem by Fritz-Greene Halleck. Consult: Mendelssohn-Bartholdy, *Geschichte Griechenlands* (Leipzig, 1870-74); Hertzberg, *Geschichte Griechenlands* (Gotha, 1876-79).

BRA, brä (It. dial., meadow). A city in the province of Cuneo, north Italy, 900 feet above the sea, 31 miles south of Turin (Map: Italy, B 3). It has a church of irregular architecture (barocco), built by Vettone in 1742, and numerous educational and charitable institutions. A trade in silk, wine, cattle, truffles, and leather is carried on. Two miles to the south-east are the ruins of the ancient Pollentia (q.v.). Pop., 1881 (commune), 15,000; 1901, 15,965; 1911, 17,278.

BRABANÇONNE, brä'bän'sün' (Fr. the

Brabantine, i.e., *chanson*, song, from the province of Brabant), LA. The national song of the Belgians, originally sung by the insurgents during the Revolution of September, 1830. A young French player of the name of Jenneval was the author of the song, which was set to music by a singer named Campenhout. Jenneval fell in a combat with the Dutch at Berchem.

BRABANÇONS, bră'ban'sŏn'. A name applied during the later Middle Ages to mercenary soldiers. In 1135 William of Ypres raised bands of mercenaries in Brabant for Stephen of Blois, the claimant of the English crown. The name Brabançons, first applied to the hirelings from Brabant, was used later for mercenaries in general. Because of their deeds of rapine, Brabançons soon became a common name for brigands.

BRABANT, bra-bānt' or bra'bant, *Fr. pion brā'ban'*. A province of Belgium, bounded on the north by the province of Antwerp, on the east by Limburg and Liege, on the south by Namur and Hainaut, and on the west by East Flanders (Map Belgium, C 4). Area, 1258 square miles. The principal towns are Brussels, Hal, Louvain, Aerschot, Diest, Tirlemont, Nivelles, and Wavre. The surface is mostly level and well wooded. It is traversed by the Dyle, Dower, and Senne rivers, and has a well-cultivated soil. The manufacturing industries comprise the production of cotton and woolen goods, ribbons, linen, hats, jewelry, etc. Pop., 1900, 1,263,535, 1905 (est.), 1,392,432, 1910, 1,469,877.

BRABANT (Lat. *Brachbantum*, Ger. *brach*; fallow, unplowed + *Bant*, district). The name formerly given to an important region in the Low Countries, extending from the left bank of the Waal to the sources of the Dyle, and from the Meuse and the plain of Limburg to the lower Scheldt. In the time of Caesar Brabant was inhabited by a mixed race of Germans and Celts, but in the fifth century it came into the possession of the Franks. After the disruption of Charlemagne's Empire it formed part of the Duchy of Lorraine (included in Germany), and after 959 of the Duchy of Lower Lorraine. The Principality of Brabant grew up around the city of Louvain as a nucleus. Beginning with Henry I (1190-1235), the rulers of Brabant bore the title of duke. John I in 1283 annexed Limburg to his dominions. The country possessed a liberal charter, known as the *Joyeuse Entrée*, or "Joyous Entrance" (granted in 1356), which guaranteed extensive rights to the nobles and the towns and restricted the powers of the Duke. In 1430 Brabant came into the possession of the house of Burgundy, and in 1477 passed to the Hapsburgs through the marriage of Mary of Burgundy with the future Emperor Maximilian. The northern part of Brabant participated in the revolt of the Netherlands against the rule of Philip II of Spain and became a part of the independent Dutch Republic. At the close of the Napoleonic wars the whole of Brabant was included in the Kingdom of the Netherlands, and was divided into three provinces. After the Revolution of 1830 the provinces of Antwerp and South Brabant became parts of Belgium. The eldest son of the King of the Belgians bears the title of the Duke of Brabant. Consult DYNTER, *Chronique des Ducs de Brabant* (Brussels, 1854-60), Omond, *Brabant and East Flanders* (London, 1907).

BRABANTIO, bră-bān'shî-ô. The father of

Desdemona in Shakespeare's *Othello*. He is a Venetian noble, vehemently opposed to his daughter's marriage with the Moor.

BRACCARA, BRACARES. See BRAGA.

BRACCIO, brăt'chō, FORTEBRACCI, COUNT OF MONTONE (1368-1424). A celebrated condottiere, born in Perugia of an old patrician family. In his early youth he became a leader of mercenaries and later was the champion of the exiled Perugian nobles. In 1408 he entered the service of Ladislaus, King of Naples, who had designs upon central Italy, and with his command crossed the Apennines, scoured the valley of the Tiber, and took several towns. In June of the same year the people of Perugia offered the dominion of their city to the Neapolitan King, on condition that he should prevent the return of the nobles. He accepted the offer, and Braccio was forced to retire to the marshes. In 1416, however, Braccio secured the possession of his native city, and the banished nobles were restored. In the same year he took Rome, but was soon obliged to evacuate it. Afterward he made terms with Pope Martin V and subsequently accepted from Joanna, Queen of Naples, the command of her land forces and the rank of High Constable of the Kingdom. He entered the Abruzzi, surprised Capua, and relieved Naples. In 1421 he became Prince of Capua, Count of Foggia, and Constable of the Kingdom of Naples. In 1424 he overran Campania and Apulia, took Bari, and advanced into Calabria, but was wounded and captured, while besieging Aquila, and died June 2, 1424. His deeds and those of his contemporary, Piccinino, are commemorated by Lorenzo Spirito, in a poem entitled *L'altro Marte* (Vicenza, 1489).

BRACCIOLINI, brăt'chō-lî-nî, FRANCESCO (1566-1645). An Italian poet, born in Pistoia, and secretary to Cardinal Barberini, afterward Pope Urban VIII. His *Croce racquistata* (1611) is one of the best of the numberless Italian imitations of Tasso's epic, but his fame rests on his burlesque poem *Lo scherzo degli dei* (1618-1626), of which the ostensible purpose was to satirize paganism in itself and in the use made of it by contemporary writers. The satire, however, turns out to be largely incidental to a much broader comic sense, expressing itself through all the motives common at the time, and in a notably chastened style which makes the work a classic. Consult M. Babì, *La vita e le opere di F. Bracciolini* (Florence, 1897), and Belloni, *Gli epigrammi della Gerusalemme liberata* (Padua, 1893). Bracciolini was a prolific cultivator of dramatic and lyric poetry as well.

BRACCIOLINI, POGGIO. See POGGIO BRACCIOLINI, GIOVANNI FRANCESCO.

BRACCIO NUOVO, nrwô'vô. An imposing vaulted hall in the Vatican, built in 1821, containing about 120 works of ancient sculpture, among them the "Apocryphomenos," the "Augustus," the "Nile Group," and the "Athlete."

BRACE (OF *brace*, *brasse*, the two arms, embrace, from Lat. *Brachia*, pl. of *brachium*, arm). A beam or bar in a roof or bridge truss placed in an inclined position and serving to hold together the principal members, generally any timber used to stiffen a framed structure. The contrivance or tool for holding a bit, used by carpenters for boring, is also called a brace (See BRIDGE, ROOF, BORING TOOLS AND MACHINERY). Braces on shipboard are ropes attached to the yardarms and employed to shift

the sails in a horizontal direction round the masts, so as to receive advantageously the wind that may be blowing at any particular moment. To *brace in* is to bring the forward yardarm farther aft, i.e., to lay the yard more nearly square; to *brace up* is the reverse of this; to *brace about* is to swing the yard from being sharp up (i.e., as far forward as possible) on one tack to sharp up on the other. In construction of all kinds the term "brace" signifies a form of prop which supports by resistance to compression as opposed to a strut, tie, or hanger, which supports by resistance to tension.

BRACE, CHARLES LORING (1826-90). An American philanthropic author. He was born at Litchfield, Conn., June 19, 1826, graduated at Yale, studied in the Yale and in the Union Theological seminaries, but never had charge of any church. In 1850 he made a pedestrian tour in Great Britain, and the next year went to Hungary. Afterward he studied the school systems of Switzerland, England, and other countries. On his return in 1852 he became associated in the early operations of the "New York Children's Aid Society," and as secretary of that society did a great work among newsboys and in riding New York City of unruly children. He became widely known as a philanthropist. He died at Campfer, in the Engadine, Switzerland, Aug. 11, 1890. He visited Europe often, and the result of his observations is found in *Hungary in 1851* (New York, 1852); *Home Life in Germany* (1853); *Norse Folks* (1857); *Races of the Old World* (1863), etc. He also published: *The New West* (1868); *Short Sermons to Newsboys* (1861); *Dangerous Classes of New York* (1872); *Gesta Christi* (1883); *The Unknown God* (1889). Consult his life, ed. by his daughter (New York, 1904).

BRACE, CHARLES LORING (1855-). An American philanthropist, son of the preceding. He was born in Dobbs Ferry, N. Y., graduated at Sheffield Scientific School, Yale University, in 1876, and worked as a construction engineer on railways in the Middle West until 1890. Then, upon the death of his father, who had founded the Children's Aid Society, he became the organization's secretary. He is author of many pamphlets, papers, and reports on the saving of children.

BRACE, DE WITT BRISTOL (1859-1905). An American physicist born in Wilson, N. Y. He graduated at the Boston University in 1881, received the degree of M.A. there a year afterward, studied at Johns Hopkins University from 1881 to 1883, and received the degree of Ph.D. from the University of Berlin in 1885. He was appointed acting assistant professor at the University of Michigan in 1887, and became professor of physics at the University of Nebraska in 1888. He has made a special study of radiation and optics and has published *Laws of Radiation and Absorption* (1901).

BRACEBRIDGE. A town in Muskoka district, province of Ontario, Canada, situated at the head of navigation of the Muskoka River, 125 miles north of Toronto, and on the Grand Trunk Railway (Map: Ontario, E 3). It has woolen, flour, saw, shingle, and planing mills, tanneries, and a linen factory. It is in a lumber-producing district and is a popular summer resort. Pop., 1901, 2479; 1911, 2776.

BRACEBRIDGE HALL, or **THE HUMOR-**

ISTS. The title of a volume of essays by Washington Irving (1822). Bracebridge Hall was taken as a type of the English country seat. It appeared under the name of "Geoffrey Crayon, Gent."

BRACE/GIR'DLE, ANNE (c.1674-1748). An English actress. She was said to have been brought up by Mr. and Mrs. Betterton and to have appeared as a child in *The Orphan* at Dorset Garden, but her early history is not well known. She took the part of Lucia in Shadwell's *Squire of Alsatia* at the Theatre Royal in 1688 and from that time is frequently on record. In 1693 she played Araminta in Congreve's *Old Bachelor*. In 1695 she joined Betterton, Mrs. Barry, and the other seceders to Lincoln's Inn Fields, and played Angelica in *Love for Love*. She was Belinda in Vanbrugh's *Provoked Wife*, and the same year (1697) Almeria in Congreve's *Mourning Bride*. Among her characters were several tragic parts, but she was thought to be best in comedy. Her personal attractions were famous. Cibber says of her: "Never was any woman in such general favor of her speculators, which to the last scene of her dramatic life she maintained by not being unguarded in her private character." The last curious phrase has been much quoted and met with some debate. Mrs. Bracegirdle's reputation for a virtue then not too common upon the stage seems, however, to have been well sustained. She was the innocent cause of the death of the actor William Mountfort, who was killed by a jealous Captain Hill and Lord Mohun. Cibber adds, "Scarce an audience saw her that were less than half of them lovers, without a suspected favorite among them." It was half believed, nevertheless, that she was privately married to Congreve. A purse of £800 was once given her by Lord Halifax and some friends as a testimonial to her character. She was noted besides for her charity to the poor. Her retirement from the stage, in 1707, was owing to jealousy of the popularity of Anne Oldfield, and she played thereafter but once, at Betterton's benefit in 1709. Consult: Genest, *History of the Stage* (Bath, 1832); Egerton, *Life of Ann Oldfield* (London, 1731); Doran, *Annals of the Stage*, ed. Lowe (London, 1888); Russell, *Representative Actors* (London, 1875); Baker, *English Actors* (New York, 1879); and Cibber, *Apology*, chap. v, ed. Bellchambers (London, 1822).

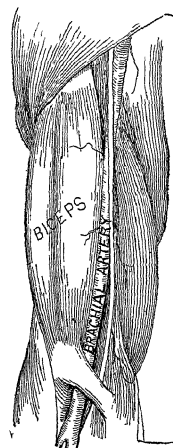
BRACE/LET (Fr. armllet, from *bras*, hand, Lat. *brachium*, arm, Eng. *brace*). An ornament worn on the arm, generally at the wrist. Bracelets and armllets have been used by every nation, both savage and civilized, from the earliest periods to our own. They are frequently mentioned in Genesis, as worn both by men (xxxviii. 18) and by women (xxiv. 30); as worn by both the Hebrews and the surrounding nations they appear in Num. xxxi. 50. Similar ornaments were worn round the ankles, but they are stigmatized by Isaiah as marks of luxury (iii. 16). The Medes and the Persians were remarkable, even among Asiatics, for their love of ornaments of this class. They wore not only bracelets and armllets, but earrings, collars, and necklaces, which often consisted of strings of valuable pearls or were enriched with other jewels. These ornaments were used to indicate the rank of the wearer and this use has continued to be made of them in the East down to the present day. In Europe bracelets and armllets were worn by both

the classical nations and the barbarians from the earliest times. The Gauls wore them, and the Sabines, in the legend of Tarpeia (qv), had ponderous golden armlets on the left arm. Armlets have been found at Tiou, Mycene, and in the early Italian graves. They were worn on both the lower and the upper arm and are frequently found in pairs. In historical times it was a mark of effeminacy for men to wear bracelets, but they are very frequently seen on women in works of art, and very many have been found in tombs. Some of these are exceedingly beautiful specimens of the goldsmith's work. The favorite form seems to have been a spiral passing several times around the arm and frequently made to resemble a serpent. We also find simple rings, often open, with the ends in the form of animals' heads, sphinxes, etc. Almost all modern forms can be found among the Greek and the Etruscan jewelry. These armlets were frequently arranged to contain amulets. Among the Romans silver armlets (*armille*) were given to soldiers or centurions as a mark of distinction.

BRACHELLI, bra-kél'le. HUGO FRANZ VON (1834-92). An Austrian statistician. He was born in Brunn and studied at the University of Vienna. He published the important statistical work *Die Staaten Europas* (1853, 5th ed., 1907). He was appointed director of the statistical department of the Austrian Ministry of Commerce in 1872. Among his more important works are *Die deutsche Staatenkunde* (1850), *Statistische Skizzen der Europäischen Staaten ausser Oesterreich* (7th ed., 1892), *der Oesterreichisch-ungarischen Monarchie* (13th ed., 1892).

BRACHET, bra-shé', AUGUSTE (1845-98). A French philologist. He was born in Tons and studied under Diez and Littré. In 1870 he was appointed professor of Romance philology at the Ecole des Hautes Etudes, Paris, and from 1872 to 1874 he was examiner of German in the Ecole Polytechnique. His *Grammaire historique de la langue française* (1867), which was the first work of its kind, enjoyed for many years a very great popularity. More than 30 editions of it appeared, notwithstanding the fact that the author refused to the very last to revise it in accord with the progress of philology. It was translated into English by Kitchin (Oxford, 1869), and was adopted as a textbook in all the leading English and American universities. His *Dictionnaire étymologique de la langue française* (Paris, 1870) was intended to be a companion volume to the grammar. With the cooperation of Gaston Paris and Moisl-Fatio, he translated into French the *Grammaire des langues romanes* of Diez (1873-76). Brachet was more successful as a journalist. His *L'Italie qu'on voit et l'Italie qu'on ne voit pas* (1881) was one of several publications in which he endeavored to show that the education of the youth of Italy was everywhere influenced by a pronounced antagonism to France and the desire of a closer alliance with Germany. This pamphlet drew a reply from the Italian Premier Crispi, who, in a long letter (*L'onorevole Crispi al Signor Brachet*, Rome, 1881), denied the truth of his assertions. Brachet replied with a detailed refutation in another pamphlet, *Al Misogallo Signor Crispi* (1882), attacking at the same time the Italian Ambassador Nigra, who had taken part in the quarrel (*Réponse a S. E. M. Nigra*, Paris, 1882).

BRACHIAL (brá'ki-al) ARTERY (Lat. *brachialis*, belonging to the arm, from *brachium*, arm). The artery between the armpit and the elbow, which is the continuation down-

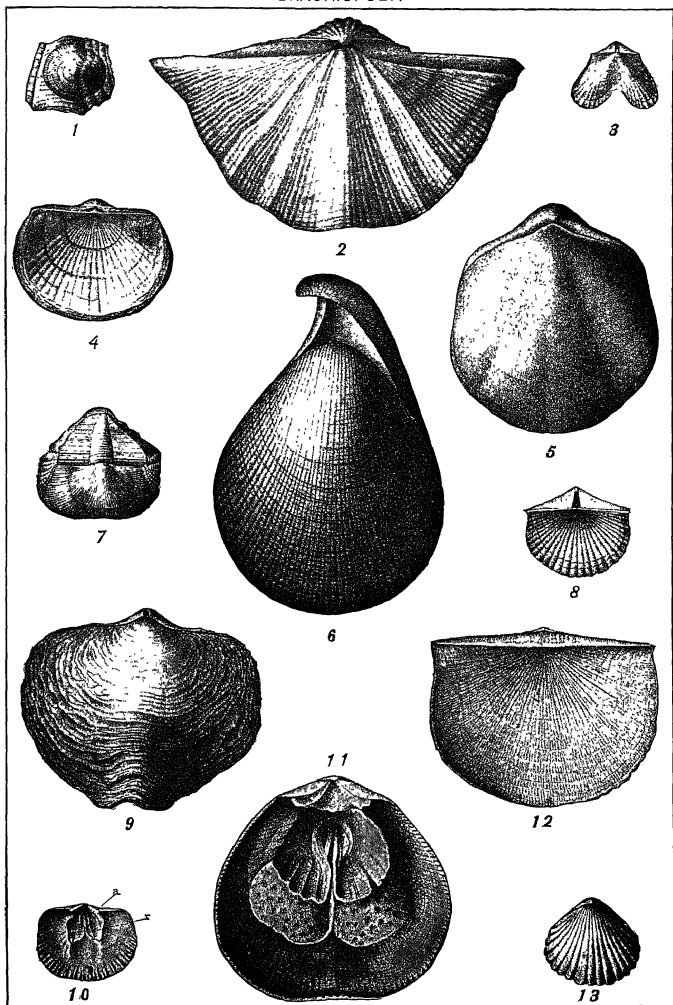


BRACHIAL ARTERY

ward of the axillary artery. The brachial artery at first runs along the inner side of the arm, just behind the inner margin of the biceps muscle and behind the great median nerve. Here it may be pressed against the bone, in cases of bleeding from any point below. Then it passes across to the front and outer side of the arm. In its course the brachial artery gives off (1) the superior profunda branch, which winds round the back of the arm bone and reappears on the outer side, where it joins some twigs coming up from the radial artery, (2) an artery which enters the bone to supply its medullary membrane, (3) inferior profunda, which, running down behind the internal condyle of the humerus, joins branches coming from the ulnar artery, (4) a short branch, the anastomotica magna, which breaks up into numerous branches, anastomosing around the elbow.

BRACHIOPODA, brák'f-óp'ô-dá (Gk. arm-footed, from *brachion*, arm + *pous*, foot). A class of peculiar animals, having bivalve shells, but differing in important points from the vast majority of recent mollusks with bivalve shells. The mantle or pallium (see MOLLUSK) in the Brachiopods consists of two broad expansions or lobes, covered by the two valves of the shell, which are dorsal and ventral, and inclosing all the other soft parts of the animal, while the chief function of these folds is unquestionably the formation of the two-shell valves, it is possible that they are supplied with blood lacuna or vessels, and may serve as the principal organs of respiration. The circulatory system is not satisfactorily known, but there is probably a vascular system present, with a heart placed above the intestine. The nervous system is weakly developed, but includes a small brain and a larger infrapharyngeal ganglion, with two principal trunks running backward from it. There are no special sensory organs of any kind. The organs by which food is procured are also remarkable—two long arms arising from the sides of the mouth, and disposed wholly or partly in spiral curves, when not extended to seek or seize prey. These arms are usually furnished with numerous vibratory filaments, which are supposed not only to aid in the capture of prey, but in the maintenance of the current necessary for respiration. The arms are often supported by a special

BRACHIOPODA

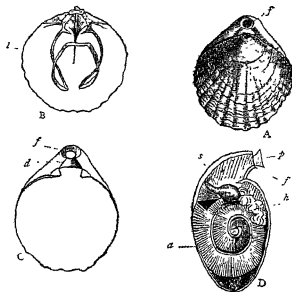


REPRESENTATIVE BRACHIOPODA

1. *Orania Bordeni*. 2. *Spirifer cameratus*. 3. *Bilobites biloba*. 4. *Tropidoleptus occidentis*. 5. *Pentamerus oblongus*. 6. *Uncites gryphus*. 7. *Derbya Bennetti*. 8. *Orthis tricenaria*. 9. *Athyris spiriferoides*. 10. *Orthis pectinella* (Interior). 11. *Rhipidomella Michelina*. 12. *Stropheodonta demissa*. 13. *Camarotoechia congregata*.

calcareous skeleton, attached to the dorsal valve.

Excretion takes place by means of nephridia, of which one or two pairs are present; these also serve as ducts for the transmission of the sexual products. They open into the mantle cavity on each side of the mouth. The Brachio-



ANATOMY OF BRACHIOPODA.

Structure of *Terebratula*.—A, the shell viewed from behind, showing the dorsal valve, and the perforated summit of the ventral valve above it. B, inner view of the dorsal valve, showing the shell loop (C) which supports the spiral arms. C, inner view of the ventral valve, showing the foramen or aperture (F) in the beak, through which (D) the muscular stalk of attachment passes. D, longitudinal and vertical section of the animal, showing the spiral arm (a), the stomach (s), and the liver (l). At (t) is the opening in the beak, with the stalk of attachment (p) passing through it. (After Davidson and Owen.)

oda are attached to solid bodies either by a footstalk or by one of the valves of the shell. When the stalk is present, it emerges either between the valves or through a hole in the posterior upward bulging of the larger ventral valve. The Brachiopoda are most notable because of the fact that in the earliest geological times they were a dominant type; but since the close of the Paleozoic Age they have been steadily decreasing in number. More than 4000 species are known, but more than 95 per cent are extinct and exist only as fossils. Most of the living Brachiopods are small, less than an inch across, but some of the extinct forms were 6 inches across. All living species are marine, and there is every reason to believe the same is true of the extinct species. Existing species are found in water of moderate depth, sometimes down to 250 fathoms. They are generally grouped in two orders: the Articulata, or Testicardines, in which the shell-valves are hinged, and the Inarticulata, or Ecardines, without hinge. Examples of Brachiopods are shown on the plate: 1, *Crania bordeni*; 2, *Spirifer cameratus*; 3, *Bilobites biloba*; 4, *Trochileptus occidentalis*; 5, *Pentamerus oblongus*; 6, *Unio gryphus*; 7, *Derbya benettii*; 8, *Orthis trocarnaria*; 9, *Athyria spiriferoides*; 10, *Orthis pectinella* (interior); 11, *Rhipidomella michelini*; 12, *Strophodontia demissa*; 13, *Cammarotoechia congregata*.

BRACHIOSAURUS, brák'i-ó-sa'rus. A dinosaur of extraordinary proportions, exceeding in size even the massive Brontosaurus (q.v.), which lived in Jurassic times. Parts of an incomplete skeleton found in western Colorado show that the animal possessed very long limbs, of which the front ones were especially long and heavy, in-

dicated that it probably obtained its food by browsing on the foliage of trees which it was able to reach without rearing upon its hind legs, as did some members of the family. It possessed a long and flexible neck and in other respects may have resembled the Brontosaurus.

BRACHIOSPONGIA, brák'i-ó-spón'jî-á (Gk. *brachion*, brachion, arm + *spongia*, sponge, sponge). A curious genus of hexactinellid sponges. This sponge has a form somewhat like that of the earth-star puffball (*Geaster*) and consists of a central depressed hollow portion from which radiate several cylindrical arms that are bent downward towards the ocean floor upon which the sponge lived. Into these arms extend prolongations of the central gastral cavity. The aperture of the gastral cavity is large and often elevated above the plane of the arms. These sponges have been found chiefly in the Ordovician rocks of Franklin Co., Ky., where they occur as hard, stony masses. The stony nature is due in part to a compact skeleton of delicate siliceous spicules that gave rigidity to the sponge mass when alive, and also to mineral matter that has been deposited in the cavities of the skeleton during the progress of petrification. Consult Beecher, "Brachiospongia," *Memoirs of the Peabody Museum of Yale University*, vol. ii, pt. i (New Haven, 1889). See also Sponges.

BRACHISTOCERONE, brá-kis'tó-krón (Gk. *brachistos*, brachistos, shortest + *chronos*, chronos, time). The curve of quickest descent. See CYCLOID.

BRACHT, brákt, EUGEN FELIX PROSPER (1842-). A German landscape painter, born at Morges, on Lake Geneva, Switzerland. He studied chiefly at Karlsruhe and Düsseldorf, under H. Gude. In 1882 he was appointed an instructor in the Berlin Academy and in 1901 professor at the Dresden Academy. He first gained recognition by his landscapes of the Lüneburg Heath and the shores of the Baltic, showing a very dramatic conception of nature. "A Stormy Day at Rügen" and "The Giant's Grave in Humling" are among the best works of this early period. He later made a journey to the East, and his glowing landscapes of Egypt, Syria, and Palestine added greatly to his reputation. "Mount Sinai" and the "Brook Kidron," in the Museum of Königsberg, "Nightfall on the Dead Sea," in the National Gallery, Berlin, are some of the best examples of these. Other well-known works of a later period are "Hannibal's Grave," "The Tomb of Cecil Rhodes," and "The Three Towers of the Gauerthal." Practically all German museums possess specimens of Bracht's art. He also painted panoramas, among others the "Battle of Chattanooga," for the United States. Consult Osborn, *Eugen Bracht* (Bielefeld, 1909).

BRACHVOGEL, brák'fó-gel, ALBERT EMIL (1824-78). A German dramatist and writer of fiction, born in Breslau. He studied engraving and modeling, but having subsequently turned author, wrote several dramas and a large number of long-winded works of historical fiction. The dramas include *Narriss* (1857; 6th ed., 1882), translated into several European languages, on which his reputation rests. Among his novels, which are rather sensational and not artistically well rounded, may be mentioned *Friedmann Bach* (1858), his best; *Benoni* (3 vols., 1860); *Beaumarchais* (4 vols., 1865); *Der Deutsche Michael* (1868); *Glanccarty* (4 vols., 1872). His *Gesammelten Romane, Novel-*

Ien and Dramen (10 vols, 1870-83), were edited by Max Ring. Consult Mittelemann, *Albert Emil Brachvogel und seine Dramen* (Leipzig, 1910).

BRACHYLOGUS, bra-kil'ō-gūs (Gk. βραχύς, *brachys*, short + λόγος, *logos*, word). A work containing a systematic exposition of the later Roman law, compiled probably in the twelfth century, though some assign it to the reign of Justinian. Its authorship is unknown. The earliest extant edition was published at Lyons in 1549. It is based mainly on the Institutes of Justinian, though it is drawn largely from the Digest and other parts of the Corpus Juris.

BRACHYURA, brak'i-ū'ra. See CRUSTACEA, CRAB.

BRACKENBURY, Rt Hon Sir Henry (1837-1914). An English soldier. He was born in Lincolnshire, England, and in 1856 joined the Royal Artillery. He served in the Central Indian campaign (1857-58) and in the Ashanti campaign (1873-74), and was chief of staff during the Zulu War (1879-80). Subsequently he was military attaché at Paris (1881-82), accompanied the Nile Expeditionary force as deputy adjutant general (1884), and, after the death of General Earle, took command of the River Column. For his services he was made major general (1885). He became lieutenant general in 1888, colonel commandant of the Royal army in 1897, general in 1901, and was director general of ordnance at the War Office in 1899-1904, when he retired. Sir Henry's publications include *Fanti and Ashanti* (1873), *Narrative of the Ashantee War* (2 vols, 1874), *The River Column* (1885), *Some Memories of my Spare Time* (1900).

BRACKENRIDGE. A borough in Allegheny Co., Pa., 23 miles from Pittsburgh, on the Pennsylvania Railroad, and on the Allegheny River. It has deposits of coal, oil, and natural gas, and includes among its industrial establishments glass factories and steel mills. Pop., 1910, 3421.

BRACKENRIDGE, HENRY MARIE (1786-1871). An American lawyer and author, son of Hugh Henry Brackenridge (q.v.). He was born in Pennsylvania, practiced law in Maryland, and in 1812 became district judge of Louisiana, in which position he was useful to the government in the War of 1812, of which he wrote a history. He advocated the acknowledgment of the independence of the South American states, and his pamphlet on the subject received an official answer from the Spanish Minister at Washington. Subsequently he was commissioner to the new republics, and published *A Voyage to South America* (1818). He was judge of the western district of Florida for 10 years and then removed to Pittsburgh, Pa. In 1841 he was commissioner under the treaty with Mexico. Besides many essays on various subjects, he published *Views of Louisiana in 1810* (1811), a part of which was reprinted in 1904 as *Journal of a Voyage up the River Missouri in 1811*, *Recollections of Persons and Places in the West* (1834), *History of the Late War between the United States and Great Britain* (6th ed., 1846), and a *History of the Western Insurrection* (1859), written in vindication of his father.

BRACKENRIDGE, HUGH HENRY (1748-1816). An American lawyer, politician, Revolutionary chaplain, poet, satirist, and miscellaneous writer, born at Campbellton, Scotland. Brackenridge was graduated from Princeton in

1771, a classmate of James Madison. Part of the graduating exercises of that year was a poetical dialogue, *The Rising Glory of America*, written by Brackenridge in collaboration with Philip Freneau (q.v.) and published in 1772. For five years he taught at Princeton and in Maryland, writing for his pupils a drama, *Bunker Hill*, published in 1776, in which year he went to Philadelphia as editor of the newly founded *United States Magazine*. Brackenridge, who had studied divinity, then became chaplain in the Revolutionary army, though never regularly ordained. Six of his *Camp Sermons* were published. He soon left the army, however, and, after studying law at Annapolis, was admitted to the bar, moved to Pittsburgh, became prominent politically, and in 1786 was sent to the Legislature. He was active as a mediator in the Whisky Insurrection (1794), and wrote, as a defense of his action, *Incidents of the Insurrection in Western Pennsylvania* (1795). In 1799 he was made judge of the State Supreme Court. The best known of his publications, and the only one of present literary interest, is a political prose satire, *Modern Chivalry, or the Adventures of Captain Farrago and Teague O'Regan, his Servant* (1796-1806). Brackenridge died at Carlisle, Pa., June 25, 1816. Consult Trent, *American Literature* (New York, 1903).

BRACKET (ME *bragget*, Fr *biaquette*, dimin of Lat **braca*, sing of *bracca*, breeches). 1 A support projecting from a wall, pier, or column, especially, such a support of approximately triangular form, this being the shape best adapted to the various strains exerted. A framed bracket has for its essential parts a horizontal top piece, a vertical wall piece and an oblique brace. If the top and brace are securely anchored, the wall piece may be omitted. Brackets, whether of stone, metal, or wood, are often of highly ornate design. In India framed brackets of stone are found, but stone brackets are usually of one piece and are called, according to their style and shape, corbels, modillions, consoles, and cantilevers. The term "corbel" is usually restricted to stone supports having slight projection in proportion to their height. 2 A projecting, often pivoted arm carrying a gaslight or electric light. See CANTILEVER, CONSOLE, CORBEL, MODILLION.

BRACKET FUNGI. Certain fungi taking the form of brackets on trees and stumps. They belong to the group Basidiomycetes (q.v.).

BRACKETT, ANNA CALLENDER (1830-1911). An American educator and author, born in Boston, Mass. She graduated at Framingham (Mass.) Normal School in 1836, and thereafter taught in several schools and held executive positions, such as the principalship of the St. Louis City Normal School. The school for girls which she established in New York City in 1872 was the first girls' school in the State to require Latin for all students and to place German in the regular course of study. She had been associated in St. Louis with W. T. Harris and Henry C. Brockmeyer in their Philosophical Society, and in 1886 she published a translation of Karl Rosenkranz's *Philosophy of Education*. She also wrote poetry, contributed to the *New York Nation*, collected a *Treasure Book of Verse* (1876), edited the valuable series of essays *Education of American Girls* (1874) and *Women and the Higher Education* (1893), and wrote *The Technique of Rest* (1892).

BRACKETT, CYRUS FOGG (1833-). An

American physicist, born at Parsonsfield, Me. He was educated at Bowdoin College, where he served as instructor in chemistry in 1863 and as professor of chemistry from 1864 to 1873. From then until 1908, when he became professor emeritus, he was professor of physics at Princeton University. He published *Physics* in 1889.

BRACKETTVILLE. The county seat of Kinney Co., Tex., 140 miles west of San Antonio (Map: Texas, B 5). It has stock-raising interests and is the seat of a United States military post, Fort Clark, established in 1852. The post was once of much importance in repressing Indian and Mexican raids from beyond the Rio Grande. Pop., 1910, 1750.

BRACKS. See **BRAXY**.

BRACQ, JEAN CHARLEMAGNE (1853-). An American publicist and college professor, born at Cambrai, France. In 1871 he came to the United States, graduated from McGill University, Montreal, in 1881, and later studied at the Newton Theological Institution, in Edinburgh, and in Paris. After serving as secretary of the American McAll Association, Philadelphia, in 1885-91, he became associate professor (1891) and then professor (1892) of Romance languages, at Vassar. From 1896 to 1903 he was editor of the *Huguenot Quarterly*. His paper, *French Rights in Newfoundland*, read before the Academy of Moral and Political Sciences in Paris, was used as the historical basis for settling the Newfoundland dispute. Besides writing much on questions of French Protestantism, Anglo-French relations, French colonial expansion, and the relation of the French government to the Church, he published *France under the Republic* (1910).

BRACQUEMONT, brák'môn', JOSEPH AUGUSTE (1833-). A French painter, etcher, and designer for ceramics. He was born in Paris and was a pupil of Guichard. He began to exhibit as a painter in the Salon of 1852, but won his reputation chiefly by his original etchings and his reproductions of the works of the great masters. He is especially successful in depicting animal life and in portraits, among which are many of noted artists and writers, and also distinguished himself as an illustrator. His etching work is represented by over 1000 plates, including a number of excellent lithographs. About 1867 he introduced successfully a new mode of decoration on china, in which the Japanese influence is predominant, and in 1872 became connected with the painting department of the porcelain factory at Sèvres. He soon afterwards established a studio for ceramic decoration on the outskirts of Paris and did a great deal of work for a Limoges factory.

BRAC'T (Lat. *bractea*, a thin plate of metal, gold leaf). Usually a leaf associated with a flower cluster (inflorescence), which is usually smaller than the ordinary leaves and often more or less modified in structure. In certain flower clusters the bracts are distributed along the axis as are the ordinary leaves. In other cases, as among the Compositæ, the bracts form a rosette beneath the cluster of flowers. Sometimes the term "bract" is applied to any kind of reduced leaf, as in buds, bulbs, etc., but more commonly the term "scale" is used in such cases. See **INFLORESCENCE**.

BRAC'TON, or BRATTON, HENRY DE (thirteenth century). An English ecclesiastic, distinguished as a judge and as the author of the

first comprehensive treatise on English law. He was born at Bretton-Clovelly, in Devonshire, and studied at Oxford, where he took the degree of doctor of laws, and where he is supposed to have lectured on the canon law. He became an itinerant judge in 1245 and shortly thereafter a judge of the King's Court. His ecclesiastical and judicial preferment went hand in hand. In 1263 he was Archdeacon of Barnstable and Chancellor of Exeter Cathedral, and in 1265 he is said to have become chief justiciary of England under Henry III. Of his history subsequently to 1267 we know nothing. His fame rests on his great work on the laws of England, *De Legibus et Consuetudinibus Angliæ* (on the Statute and Common Law of England), which has been characterized as "the crown and flower of English mediæval jurisprudence" (Pollock and Maitland, *History of English Law*). It is a systematic treatise, written in Latin, on a large and comprehensive plan, not wholly completed, drawing its form largely from the Roman law, but deriving its substance almost entirely from the precedents of the English law courts. The belief, long entertained, that the book is a composite of Roman and English law, that it represents an attempt to refine and improve the common law by introducing the conceptions of the civil law, has been disproved by recent investigations of the plea rolls and other authorities upon which the author relied. The work was an immediate success. Some 50 manuscripts of it have come down to us, and in that age of legal activity it became the model of numerous other treatises, some of which, like those of Fleta and Britton, have also survived. But Bracton had no successor until, 500 years after his death, Blackstone gave his *Commentaries* to the world. The earliest edition of Bracton's *De Legibus* is the folio edition of 1569; the best edition is the one edited by Sir Travers Twiss, and issued in 1879-83, with an English translation, under the authority of the Lords Commissioners of the Treasury, and under the direction of the Master of the Rolls. Certain British Museum manuscripts containing the record of some 2000 cases were discovered about 1884 by Prof. Paul Vinogradoff to have been compiled by Bracton as a "Note Book," and were edited by F. W. Maitland for publication. Consult: *Bracton's Note Book*, edited by Maitland (London, 1887); *Select Passages from Bracton and Azo*, edited for the Selden Society by Maitland (London, 1895); Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1889); Scrutton, *Influence of the Roman Law on the Law of England* (Cambridge, Eng., 1885).

BRADAMANT. The daughter of Amon and Beatrice and the sweetheart of Roger the Moor. The latter becomes a Christian on her making this act a condition of their marriage. Bradamant, known as the Virgin Knight, had white armor and an irresistible spear. She appears in Boiardo's *Orlando Innamorato* and Ariosto's *Orlando Furioso*. There is a play with the title *Bradamante*, a tragi-comedy by Robert Carnier (1580); a tragedy by La Calprenède (1636); a tragedy by Thomas Corneille (1695), besides several others.

BRADBURY, JOHN BUCKLEY (1841-). An English physician and author. He was born at Saddleworth, Yorkshire, and was educated at King's College, London, and at Cambridge. He became physician to Addenbrooke's Hospital,

Cambridge, in 1869 Bradshaw lecturer at the Royal College of Physicians, London, in 1895, Croonian lecturer to that body in 1899, and examiner in materia medica in the University of Oxford His publications include *On Vertigo Its Causes, Importance as a Symptom, and Treatment* (1870), *Inaugural Lecture on Pharmacology* (1894), *On Some New Vaso Dilators* (1895), *On Some Points Connected with Sleep, Sleeplessness, and Hypnotics* (1899)

BRADDOCK A borough in Allegheny Co, Pa., 10 miles east of Pittsburgh, on the Monongahela River, and on the Pennsylvania, the Baltimore and Ohio, and the Pittsburgh and Lake Erie railroads (Map Pennsylvania, B 8) It has extensive manufactures of steel, wire, ferromanganese, pig iron, steel rails, cement, machine tools, and plaster Braddock has the first Carnegie library established in America, a hospital, Federal building, and Kenneywood Park Settled probably about 1795 on the site of Braddock's defeat in 1755, Braddock was incorporated in 1867 The borough is governed by a burgess, holding office for three years, and a council in whose power rests the appointment of the important officials of the city The water works are owned and operated by the borough Pop, 1890, 8561, 1900, 15,654, 1910, 10,357

BRADDOCK, EDWARD (1695-1755) A British general, who in 1755 led an expedition against Fort Du Quesne, in the French and Indian War (qv) With a force of 1200 picked men, regulars and provincials, he reached the Monongahela, a branch of the Ohio, on July 8. Disregarding the advice of Franklin and Washington, of the probability of a surprise, he advanced on July 9 in confident security until, when seven miles from the fort, the force was ambushed by Indians and attacked simultaneously in front by the French Complete rout ensued, as the British were cut to pieces, until the survivors, less than half of the command, were led to safety by Colonel Washington, one of the General's aids Braddock himself, while striving to re-form his men, was mortally wounded and died a few days later at Great Meadows, 50 miles away, whither he had been carried after the defeat Consult *The History of the Expedition against Fort Du Quesne in 1755, Edited from the Original Manuscripts*, by Winthrop Sargent (Philadelphia, 1856), and Parkman, *Montcalm and Wolfe* (Boston, 1884)

BRAD'DON, MARY ELIZABETH (Mrs Maxwell) (1837-) An English novelist, born in London In 1860 she wrote a comedietta called *The Loves of Arcadia*, and the following year published *Caribals and Other Poems* Her first great success, however, came with the publication, in 1862, of *Lady Audley's Secret* This has since been extended by the appearance of, among other books, *John Marchmont's Legacy* (1863), *The Doctor's Wife* (1864), *Only a Clod* (1865), *The Trail of the Serpent* (1866), *Run to Earth* (1868), *Dead Sea Fruit* (1868), *The Lovels of Arden* (1871), *Weavers and Weft* (1877), *One Life, One Love* (1890), *Under Love's Rule* (1897), *In High Places* (1898), *His Darling Son* (1899), *The Conflict* (1903), *The Rose of Life* (1905), *The Green Curtain* (1911), *Miranda* (1913) Miss Braddon in 1863 was regarded as a remarkably sensational and almost "improper" writer—an opinion that was quite unjustified One of her novels, *The Doctor's Wife*, closely resembles Flaubert's masterpiece of mordant realism, *Madame Bovary*

She was married to John Maxwell, a London publisher, in 1874

BRADFORD (AS *brād*, broad + *ford*, ford). An important manufacturing city in the West Riding of Yorkshire, England, on a tributary of the Aire, 8 miles west of Leeds (Map England, E 3) Among the notable public buildings are the church of St Peter, dating from 1485, the Fexchange (1867), the Town Hall, Piece Hall, St George's Hall (a concert hall seating some 4000 people, built in 1853), and the Cartwright Memorial Hall (1904), erected in memory of Dr Edmund Cartwright (qv), inventor of the power loom and combing machine Bradford has been a parliamentary borough since 1832 and returns three members to Parliament It was made a city in 1897 The city's affairs are administered by a lord mayor (since 1907), a municipal council of 63, and a board of aldermen of 21 members Bradford is one of the most highly municipalized cities in Great Britain The water, gas, and electric light works, the street and suburban railways, markets, slaughterhouses, baths, sterilized milk depot, filtering plants, cemeteries, etc., are all owned and operated by the corporation The municipal railway, opened in 1907, extends into the Nidd valley, the chief source of the city's water supply The net receipts from this service in 1909-10 amounted to nearly \$445,000 The water works represented (in 1911) an outlay of more than \$18,000,000, and their operation in 1909-10 earned a net surplus of \$75,000 The electric supply plants represented a capital outlay of about \$3,500,000, and their operation in the same period earned net receipts of about \$300,000 Among other municipal institutions are public markets, and a "conditioning house" for testing the quality of raw wool and woolen goods, certificates as to their quality being issued

Bradford has seven parks and numerous small recreation grounds It has an excellent public-school system, the United Yorkshire Independent College (1888), a Technical College (opened in 1882 and under the corporation since 1889), a mechanics' institute (founded in 1832, and housed in the fine Mechanics' Hall since 1871), 24 public circulating libraries, and an art museum Among its benevolent and charitable institutions are several hospitals, including one for fever patients, a blind and a deaf-and-dumb asylum, and an orphan asylum Bradford is the chief seat in England of the spinning and weaving of worsted yarn and the great mart for the long wools used in worsted fabrics It also manufactures woollens, silk, cotton, velvet, and plush Bradford is the seat of a United States consulate, in 1912 its exports to the United States amounted to \$14,924,392 in value In the vicinity coal and iron are mined, and the city has several extensive iron foundries Bradford is on four railway lines and on the Bradford Canal Its street railways are owned by the corporation, but are operated by private companies, with the exception of a short section of trolley line operated by the city Baptists, Independents, and Wesleyans have colleges near the town The first English temperance society was established at Bradford in 1837 The Romans seem to have worked iron mines here, Roman coins having been found in foundry refuse near the town The manor of Bradford, after the Conquest, was held in turn by the De Lacey, the house of Lancaster, the crown, and the Corporation of

London. During the Civil War the citizens of Bradford sided with Parliament and twice defended the town successfully against the Royalists, but were forced to surrender to the Earl of Newcastle in 1643. Sir Titus Salt (q.v.), the founder of the famous manufacturing village near Shipley, called Saltaire, was a merchant of Bradford and at one time its mayor. Pop., 1891, 265,728; 1901, 279,809; 1911, 288,505. Consult Ogden, *Bradford* (London, 1910).

BRADFORD. A city in McKean Co., Pa., 78 miles south of Buffalo, N. Y.; on the Buffalo, Rochester, and Pittsburgh, the Pennsylvania, and the Erie railroads (Map: Pennsylvania, D 2). The Kinzua Bridge, 14 miles distant, is 300 feet high and 2100 feet long. Noteworthy features of the city are its large, well-equipped hospital, the opera house, driving park, an historical society, and the public library. Bradford is in a petroleum and natural-gas region; has a large trade in oil, wood acid, alkalis, and gasoline; and extensive manufactures of refined oil, oil-well tools, building and paving brick, tile, vacuum cleaners, silks, furniture, boilers, gas engines, and air compressors. There are also large tile and cutlery works. Settled in 1823, Bradford was chartered as a city in 1879. The commission form of government was adopted in 1914. The city owns and operates its water works and is supplied with natural gas in abundance for fuel and lighting purposes. Pop., 1900, 15,029; 1910, 14,544.

BRADFORD, ALDEN (1765-1843). An American writer, born in Duxbury, Mass. He graduated at Harvard in 1786; was minister of a Congregational church in Wiscasset, Me. (1793-1801); was Secretary of State for Massachusetts (1812-24), and, in 1826, edited the *Boston Gazette*. Among his publications are: *Speeches of the Governors of Massachusetts from 1765 to 1775* (1818); *A History of Massachusetts, from 1764 to 1820* (1822-29); *Life of Jonathan Mayhew* (1838); *History of Federal Government* (1840); *New England Chronology, 1497-1800* (1843).

BRADFORD, AMORY HOWE (1846-1911). An American clergyman. He was born at Granby, N. Y., graduated in 1867 at Hamilton College, and in 1870 at Andover Theological Seminary, and in the latter year became pastor of the First Congregational Church, Montclair, N. J. With the Rev. C. F. Deems he organized the American Institute of Christian Philosophy. He founded the Whittier House Social Settlement of Jersey City and was a founder of the Congregational Club of New York. In 1896 he was a member of the deputation sent by the American Board of Foreign Missions to investigate mission work in Japan. In 1904 he was chosen president of the American Missionary Association. He became an editor of the *Outlook*, of New York, and published *The Pilgrim in Old England* (1893); *The Growing Revelation* (1897); *Heredity and Christian Problems* (1895); *The Age of Faith* (1900); *Messages of the Masters* (1902), *My Brother* (1910); *Preludes and Interludes* (1911).

BRADFORD, GAMALIEL (1863-). An American writer, born at Boston, Mass. He entered Harvard College in 1882, but was obliged to leave on account of ill health. After 1886 practically all his time was given to writing. He is author of *Types of American Character* (essays, 1895); *The Private Tutor* (1904); *A Pageant of Life*, poems (1905); *Between Two*

Masters (1906); *Matthew Porter* (1908); *Lee, the American* (1912).

BRADFORD, JOHN (c.1510-55). An English minister, born in Manchester. He was secretary to John Harrington of Exton, paymaster of the English forces in France, and was accused of using money not his own because he made restitution of a sum of money which his master had unlawfully taken. In 1547 he began to study law, but turned to the study of divinity and became a fellow of Pembroke Hall, Cambridge, in 1549, and prebendary of St. Paul's, London, in 1551. He was also chaplain to Edward VI and one of the most popular preachers in the kingdom. When Mary came to the throne, he was accused of sedition and tried before Gardiner, and was condemned and burned at the stake at Smithfield, July 1, 1555. Many of his short works are found in the issues of tract societies. There is a complete edition, with a life by Rev. Aubrey Townsend (1848-53).

BRADFORD, WILLIAM (1589-1657). One of the leaders and the historian of the Massachusetts Pilgrims, and the second Governor of Plymouth Colony. He was born in Austerfield, Yorkshire, England; joined the Separatist church of John Robinson (q.v.) at the age of 17, and, after an unsuccessful attempt to leave England in 1607 (for which he was for a time imprisoned), joined the Pilgrims in Holland, where he became a silk dyer and afterward a merchant. He advocated the removal to America and was one of the Pilgrims who in 1620 came over in the *Mayflower* and founded Plymouth Colony. In April, 1621, he was chosen Governor to succeed Carver, and by repeated reflections continued to hold this position until his death, except for five years, when "by importunity he got off." During all this period the story of his life is inseparably connected with that of the Colony, and by his wisdom, his tact, and his great administrative ability, he did perhaps more than any other one man to make the experiment a success. In particular he quickly saw the pernicious effects of the communal system and in 1625 insisted that it be abolished. The second patent of Plymouth was issued (in 1629) to "William Bradford, his heirs, associates, and assigns." Bradford rendered an inestimable service to students of American history by preparing a careful *History of Plymouth Plantation* (from 1602 to 1647), upon which, directly or indirectly, all subsequent accounts of the Pilgrims have been based. This history, says Tyler (*History of American Literature*, vol. i, p. 118), "is an orderly, lucid, and most instructive work; it contains many tokens of its author's appreciation of the nature and requirements of historical writing, and though so recently published in a perfect form, it must henceforward take its true place at the head of American historical literature" and win for its author "the dignity of being called 'the father of American history.'" The manuscript of this work was used by Morton in the preparation of his *New England's Memorial* (1669); by Prince in the preparation of his *Chronological History of New England* (1736), and by Hutchinson in the preparation of his *History of Massachusetts Bay* (1767). It was stored for many years in the tower of the Old South Church, but disappeared during the Revolutionary War; was found in the Fulham Library, England, in 1855; and in 1898 was returned to the United States and deposited among the Massachusetts ar-

chives The history was first published, with notes by Charles Deane, as a volume of the *Collections of the Massachusetts Historical Society* in 1856, and since then has been twice reprinted in facsimile, with an introduction by John A. Doyle (London and Boston, 1896), and under the title, *Bradford's History of Plymouth Plantation from the original Manuscript, with a Report of Proceedings Incident to the Return of the Manuscript to Massachusetts* (Boston, 1898). Of these editions, Deane's is the most useful for the student. His own account of the finding is in *Proceedings of the Massachusetts Historical Society* for April, 1853, vol. III. In addition to the history, Bradford wrote *Some Observations of God's Merciful Dealings with Us in the Wilderness, A Word to Plymouth, A Word to New England, and Epitaphium Meum*—all of which were left in manuscript and have been published in the *Collections of the Massachusetts Historical Society. A Diary of Occurrences Covering the First Year of the Colony*, written in conjunction with Edward Winslow, was published in 1622 and was long known as *Mourt's Relation*, and *A Dialogue, or the Sum of a Conference Between Some Young Men Born in New England and Sundry Advent Men that Came Out of Holland and Old England* was published in 1648, and has been republished in vol. 11 of the *Old South Leaflets* (Boston). Most of Bradford's shorter writings may be found in Young's *Chronicles of the Pilgrims* (Boston, 1841). Consult *The New England Genealogical Register* for 1850, Walker, *Ten New England Leaders* (New York, 1901), Tyler, *A History of American Literature, 1607-1765* (New York, 1898), and Justin Winsor, *Governor Bradford's Manuscript History and its Transmission to Our Times* (Cambridge, 1881). For the circumstances under which the manuscript returned to America, consult G. F. Hoar, "Return of the Manuscript of Bradford's History," in *Proceedings of the Massachusetts Historical Society* (1901-02). For an interesting life of Bradford, consult Cotton Mather, *Magnalia* (London, 1702).

BRADFORD, WILLIAM (1663-1752) An American printer. He was born in Leicester, England, and with other Quakers emigrated to America in 1682. In 1685 he established in Philadelphia the first printing press in the Middle Colonies, and in 1690 he with two others built a paper mill on the Schuylkill. In 1691 he was arrested and tried by the authorities for "seditious libel," his press and publications were confiscated, but the jury refused to convict him. He removed to New York in 1693 and in the same year established the first press in that Colony. On Oct. 16, 1725, he began the first newspaper in New York City, and the fourth in America, *The New York Gazette*. For years he was the only printer in the Colony and for 50 years held the office of public printer. He had two sons, one of whom, Andrew Sowles Bradford (1686-1742), was a prosperous publisher in Philadelphia. Consult Wallace, *An Address at the Celebration by the New York Historical Society of the 200th Birthday of William Bradford* (Albany, 1863).

BRADFORD, WILLIAM (1827-92) An American marine painter. He was born of Quaker parents at New Bedford, Mass., in 1827 or 1830 (the date is variously given), and was educated for business, but developed a talent for painting in middle life. His art was formed

under the influence of Albertus van Beest, whose studio at Farnhaven he shared for two years. With the explorer Dr. Hayes, he undertook several voyages to Nova Scotia and Labrador as far north as Greenland. He is known especially as the painter of icebergs and polar scenery, which he renders with faithful accuracy, but in the hard and dry manner of his day. His paintings were generally exhibited in England, where they enjoyed much popularity. They include "The Steamer Panther among Icebergs and Field-Ice in Melville Bay," exhibited in the Royal Academy (1875) and purchased by Queen Victoria, "Under the Light of the Midnight Sun," "A Squall in the Bay of Fundy," "The Coast of Labrador," "Crushed by Icebergs," "Sunset in the North" (1886), and "Whalers after the Nip in Melville Bay" (1880).

BRADFORD-ON-AVON (AS *Bradford*, from *brād*, broad + *ford*, ford) A market town in Wiltshire, England, on the Avon, and on the Kennet and Avon Canal, 6 miles east-southeast of Bath, and 20 miles northwest of Salisbury (Map, England, D 5). The Avon, which is crossed by two bridges, divides the town into the old and new. The small church of St. Lawrence is one of the few examples of Saxon architecture in England. It was founded by St. Aldhelm in the early eighth century. The present building is now supposed to be a restoration dating from the last quarter of the tenth century and due to Dunstan, Archbishop of Canterbury. The town was noted for many centuries for its manufacture of fine broadcloths. It now manufactures rubber goods and has breweries, quarries, and iron foundries. Pop., 1891, 4943, 1901, 4514, 1911, 4501.

BRADLAUGH, brād'la, CHARLES (1833-01) An English Radical politician and social reformer. He was born in London, Sept. 26, 1833. His early education was meagre, for he had to support himself, at times by running errands. At the age of 17 he enlisted in the army. He secured his discharge in 1853, became clerk to a London solicitor, and soon was noted as an agitator, free-thought lecturer, and as a pamphleteer under the name of "Iconoclast." He published the *National Reformer*. In 1873 he made a short visit to the United States, lecturing in the larger cities. In 1876, with Miss Annie Besant he was sentenced to six months' imprisonment and £200 fine for republishing the Malthusian *Fruits of Philosophy*, but the conviction was quashed on appeal. Elected member of Parliament for Northampton in 1880, he pleaded that as an atheist he had the right to affirm, but when this request was denied, expressed his willingness to take the oath. This the House decided he was disqualified from doing, he was ordered to leave, and on his refusal was placed in custody. His seat was declared vacant by the court to which the case was carried. But his constituency returned him in 1881, he presented himself, was again denied the privilege of taking the oath, and on his refusal to leave the House was forcibly ejected. Similar scenes occurred at the proroguing of Parliament in 1882 and 1883, and in the latter year Bradlaugh won a suit which he brought against the sergeant at arms for unlawful ejection. The case, however, was decided on technical grounds, and the invalidity of his title to a seat in the House was reaffirmed. In 1885 he was again returned for Northampton, and was permitted to take the oath, and shortly before

his death, Jan. 30, 1891, Parliament expunged from its records the resolution forbidding him to take the oaths. Of his writings, *The Impeachment of the House of Brunswick* (Boston, 1875) attained the greatest popularity. It advocated the repeal of the Hanoverian settlement of the crown at the Queen's death. Consult: Headingley, *Biography of Charles Bradlaugh* (London, 1883); Bonner, *Charles Bradlaugh* (London, 1894); Birrell, *In the Name of the Bodleian* (New York, 1905).

BRADLEY, EDWARD (*Cuthbert Bede*) (1827-89). An English author. He was born at Kidderminster, graduated in 1848 at Durham University; was consecrated a priest of the Established church, and was rector of Denton, Strutton (1871-88), and Lenton. He contributed to periodicals and wrote numerous volumes both of prose and verse, of which the best known is *The Adventures of Verdant Green* (1853-57), a humorous story of life at Oxford.

BRADLEY, GEORGE GRANVILLE (1821-1903). An English clergyman. He was educated at Rugby and Oxford, served as assistant master at Rugby, became head master of Marlborough College in 1868, and was ordained in the same year. In 1870 he was made master at University College, Oxford. He was honorary chaplain to the Queen from 1874 to 1876 and succeeded A. P. Stanley as dean of Westminster in 1881. Among his publications are *Recollections of Arthur Penrhyn Stanley* (1892); *Lectures on Job* (1884); *Lectures on Ecclesiastes* (1885); *Life of Dean Stanley* (1892); *Aids to Writing Latin Prose Composition* (1892).

BRADLEY, HENRY (1845-). An English scholar. He was born in Manchester, Dec. 3, 1845; was educated at Chesterfield Grammar School; spent some time in teaching and was employed as clerk and foreign correspondent at Sheffield till 1884, when he went to London. Bradley has contributed to periodicals and encyclopedias and edited or revised several philological works. In 1889 he became one of the editors of the great Oxford English Dictionary. Two notable works of his are: *The Story of the Goths* (1888); and *The Making of English* (1904).

BRADLEY, JAMES (1693-1762). An English astronomer. He was born at Sherborne in Gloucestershire and was educated at Oxford. Afterward he studied with his uncle, the Rev. James Pound, who was at that time one of the best astronomers in England. He was elected a fellow of the Royal Society in 1710. In 1721 he was appointed to the Savilian chair of astronomy at Oxford University. In 1729, after repeated observations, he announced his important discovery of the aberration of light. The theory advanced by Bradley to explain this complex phenomenon has remained practically unchanged. (See *ABERRATION OF LIGHT*.) In 1742 Bradley, who had been styled by Newton "the best astronomer in Europe," was appointed Astronomer Royal and entered upon a career of great activity at Greenwich. Several years afterward he discovered nutation, or the inconstancy of the inclination of the earth's axis to the ecliptic. For this discovery he received the Copley medal in 1748. In the same year he secured a new instrumental outfit for the Royal Observatory, by means of which the foundations of modern sidereal astronomy were laid. He left at his death 13 manuscript volumes of observations, which were published in 1798-1805.

The value of these observations was enormously increased by Bessel, who undertook their systematic reduction and extracted from them the catalogue of 3222 stars which he published in 1818 under the appropriate title of *Fundamenta Astronomiae*. Bradley's observations of the moon and the planets were reduced by Airy and afforded valuable data for the correction of the lunar and planetary theories. His *Miscellaneous Works and Correspondence* was published in 1832.

BRADLEY, JOSEPH PHILLO (1813-92). A distinguished American jurist, born at Berne, N. Y. He graduated at Rutgers in 1836, was admitted to the New Jersey bar in 1839, was retained as counsel to various railway corporations, and became prominent in several cases of importance. In 1870 he was appointed an associate justice of the United States Supreme Court and assigned to the Fifth Circuit (Gulf States, Georgia to Texas), from which he was subsequently transferred to the Third (Pennsylvania, New Jersey, and Delaware). He was a member of the Electoral Commission of 1877, which decided the election of 1876 in favor of Hayes, and supplemented his vote by an opinion noteworthy for logical clearness. A profound and discriminating student of the law, he was in particular distinguished for opinions on civil rights, the right of habeas corpus and admiralty jurisdiction, and in those involving constructions of the Federal Constitution. In 1870 he pronounced the centennial address at Rutgers College. His *Miscellaneous Writings* were published in 1902 with a biographical introduction.

BRADLEY, MISS K. H. See **FIELD, MICHAEL**.
BRADLEY, WILLIAM O'CONNELL (1847-1914). An American public official and legislator, born near Lancaster, Garrard Co., Ky. He was admitted to the bar in 1865, was elected prosecuting attorney of Garrard County in 1870, and was presidential elector in 1872. In the Republican National Convention of 1880 he made a speech seconding the nomination of Grant for President, in 1884 he defeated the movement to curtail southern representation in the Republican National Convention, four years later he received 105 votes for the vice-presidential nomination, and in 1904 he seconded the nomination of Roosevelt for President. For twelve years he was a member of the Republican National Committee. In 1895-99 he was Governor of Kentucky. He became United States Senator for the term of 1909-15.

BRADSHAW, HENRY (c.1450-1513). An English writer of verse and Benedictine monk of Chester. He wrote a Latin treatise, *De Antiquitate et Magnificentia Urbis Cestrie* (1513); and a *Life of St. Werburgh* (1500), in English verse. *The Holy Lyfe and History of Saynt Werburge* was published posthumously (1521).

BRADSHAW, JOHN (1602-59). An English Commonwealth judge, famous as one of the regicides. He was born near Stockport, Cheshire. He studied law and was called to the bar at Gray's Inn, 1627. He gained a good practice by his ability and learning, held several offices, and was elected president of the High Court of Justice for the trial of King Charles I in 1649. As the reward of his services at that occasion, he was made President of the Council of State, and Chancellor of the Duchy of Lancaster; he also received a grant of estates worth £2000 per annum. Bradshaw, however, frequently opposed the Protector when unable to see or comprehend

the necessity for his rigid rule. After Cromwell's death and the abdication of Richard Cromwell, he was Lord President of the Council of State, and a commissioner of the Great Seal. He was a friend of Milton, who eulogized him. He died in London, Oct. 31, 1659. His body was buried with pomp in Westminster Abbey, but at the Restoration was exhumed and hung on a gibbet, with those of Cromwell and Ireton.

BRADSTON. See BRAXY.

BRADSTREET, ANNE (c 1612-72). An American poet. She was born at Northampton, England, about 1612. Mrs. Bradstreet was a daughter of Gov. Thomas Dudley. She married the future Governor Bradstreet in 1623, went with him to New England (1630), and in the intervals of household duties involved in the rearing of eight children became a voluminous author, who won for herself from her compatriots the admiring designation, "The Tenth Muse." Her poems were published under a title which gives a tabular view of their contents, to wit: *Several Poems Compiled with Great Variety of Wit and Learning, Full of Delight, Wherein Especially is Contained a Complete Discourse and Description of the Four Elements, Constitution, Ages of Men, Seasons of the Year, Together with an Exact Epitome of the Three First Monarchies, viz., The Assyrian, Persian, and Grecian, and the Beginning of the Roman Commonwealth, to the End of Their Last King, with Divers Other Pleasant and Serious Poems by a Gentlewoman of New England* (London, 1650). It is on the title-page of this edition that she is called "The Tenth Muse." The *Four Monarchies* (1867) is based on Sir Walter Raleigh's *History of the World*, but she drew her chief poetic inspiration from Sylvester's translation of *The Creation*, by Dr. Bartas (q.v.), 1606. A second edition appeared at Boston in 1678, with additions, among which is *Contemplations*, her best poem. Her complete *Works*, which include certain memorials of her life and prose aphorisms, were edited by J. H. Ellis (1867), and for the Society of the Duodecimos (1897), with an introduction by Charles Eliot Norton. Mrs. Bradstreet's verses are in the main lacking in poetic power, and the modern reader wonders at the admiration they excited. Cotton Mather said they "would outlast the stateliest marble." Her contemporaries "weltered in delight" or were "sunk in a sea of bliss" at their perusal. They were at least the best of her generation in America. They show an indomitable assertion of a woman's right to thought and learning. She deserves an honored place in the history of New England culture, as one of the first writers in America devoted to literature for its own sake. Consult Wendell, *A Literary History of America*, pp. 36, 40, 119 (New York, 1900).

BRADSTREET, JOHN (1711-74). An English soldier, who spent nearly his whole life in service in North America. In 1745 he served in the Louisiana expedition as lieutenant colonel in Popperell's regiment and later in the year was raised to the rank of captain. In 1746 he was appointed Lieutenant Governor of St. John's, and in 1755 became adjutant general under General Shirley (q.v.). During the summer of 1756 he was in charge of the conveying of a large quantity of stores from Albany to Oswego and was attacked by a strong party of French, whom he defeated. He took part in the attack on Ticonderoga in 1758 and immediately

thereafter became quartermaster, with the rank of colonel. On August 27 of this year he captured Fort Frontenac and in 1759 accompanied General Amherst on his expedition against Ticonderoga and Crown Point. He commanded an expedition against the Indians during the Conspiracy of Pontiac and on Sept. 7, 1764, made a treaty with them at Detroit. In 1772 he became a major general.

BRADSTREET, SIMON (1603-87). An early Colonial Governor of Massachusetts, born in Horbling, Lincolnshire, England. He was educated at Cambridge and in 1630 emigrated to America and settled at Cambridge, Mass. He was an assistant judge, and was successively secretary, agent, and commissioner of the United Colonies. In 1662 he was sent to congratulate Charles II on his restoration. He was Assistant from 1630 to 1679, was Deputy Governor from 1673 to 1679, and was Governor from 1679 to 1686, when the Massachusetts charter was revoked. He was restored to office in 1689 and remained in power until the new charter arrived in 1692, when he was made first counselor. He was generally popular as a magistrate, though in several instances, notably with regard to the witchcraft delusion of 1692, he was opposed to the majority of the colonists. His wife was Anne Bradstreet, the poet, daughter of Thomas Dudley (q.v.).

BRADWARDINE, BRAD'WARDEN, THOMAS (c 1290-1343). An English scholar, born at Hatfield in Sussex. He early acquired the reputation of being a profound scholar, skillful mathematician, and able divine, which won him the title "Profound Doctor." He was chancellor of the university, later became confessor to Edward III, and finally was consecrated Archbishop of Canterbury, but died of plague shortly after his consecration. Part of Bradwardine's mathematical work was on star polygons, a subject which fascinated the great Kepler, Regiomontanus, and Cardan, and which has attracted much attention in recent times. The trigonometry of the Arabs was known to him, and his philosophic works contain discussions of the infinite and the infinitesimal. His chief works are *De Causa Dei* (1618), *De Geometria Speculativa* (1495, 1512, 1530), *De Proportionibus* (1495), *De Quadratura Circuli* (1495), *De Arithmetica Practica* (1502). Consult Hahn, *Thomas Bradwardinus* (Munster, 1905).

BRADY. A city and the county seat of McCulloch Co., Tex., 108 miles (direct) northwest of Austin, on the Frisco Lines and the Gulf, Colorado, and Santa Fe railroads (Map Texas, C 4). Brady is in a rich agricultural region, raising extensively cotton, pecans, wool, mohair, cattle, and stock. It has cotton oil and planing mills, gins, a compress, a creamery, and an ice plant. The city, incorporated in 1906, is governed by a mayor and board of aldermen, and owns its water works and electric light plant. Pop., 1900, about 700, 1910, 2669.

BRADY, AGÉNOR. See BARDOUX, AGÉNOR.

BRADY, ANTHONY NICHOLAS (1843-1913). An American capitalist, born at Lille, France. His parents came to the United States when he was a child, and he attended school in Troy, N. Y. After being employed in various ways for some years, he opened a tea store in Albany, and by gradually forming a chain of stores dealing in tea gained virtual control of the local sale of this commodity. Subsequently he became interested in granite quarries and in nu-

merous public utilities and staple products. He was one of the organizers of the Metropolitan Traction Company in New York City and, participating in 1887 in the reorganization of the Brooklyn Rapid Transit Company, was at the time of his death chief of its board of directors. He had large holdings also in Washington and Philadelphia street railways, in the New York Edison Company, and in powerful tobacco, rubber, and iron-pipe corporations.

BRADY, CYRUS TOWNSEND (1861-). An American clergyman and author, born in Allegheny, Pa. He graduated in 1883 at the United States Naval Academy, and after work in connection with Western railways was in 1890 ordained priest of the Protestant Episcopal church. He was rector of churches in Missouri and Colorado and subsequently was appointed Archdeacon of Kansas. From 1895 to 1899 he was Archdeacon of Pennsylvania, and thereafter he had charges at Philadelphia (1899-1902), Toledo (1905-06), Kansas City (1909-13), and Mt. Vernon, N. Y. (1913-14). During the Spanish-American War he was chaplain of the First Pennsylvania Volunteers. He published lives of *Stephen Decatur* (1900) and *Commodore Paul Jones* (1900); *Recollections of a Missionary in the Great West* (1900), his best work; *Border Fights and Fighters* (1902); *Sir Henry Morgan, Buccaneer* (1903); *Indian Fights and Fighters* (2 vols., 1903-07); *The Conquest of the South West* (1905), and much fiction, including *The Love Test* (1908), *The Ring and the Man* (1909); *The Better Man* (1910); *As the Sparks Fly Upwards* (1911); *The Master of Reparaté* (1912); *The Fetters of Freedom* (1913).

BRADY, FRANCIS XAVIER (1857-1911). An American Catholic priest and educator, born near Gettysburg, Pa. He entered the Society of Jesus; studied at Woodstock College, Md., in 1876-79 and (after teaching at Gonzaga College, Washington, D. C., in 1884-86) was ordained a priest in 1886; and until 1892 was director of the Sacred Heart League of the United States and edited Catholic periodicals. He was vice president of Loyola College, Baltimore, in 1892-95, and its president after 1908, having had charge of St. Ignatius's Church, Baltimore, in the interval. He wrote a biography of St. Aloysius (1887) and devotional works, including *The Holy Hour* (1890) and *The Great Supper of God* (1901).

BRADY, GEORGE STEWARDSON (1832-). An English zoologist and paleontologist. He was born at Gateshead-on-Tyne and was educated at the University of Durham. He practiced medicine and surgery in Sunderland after 1857 and became professor of natural history in the Durham College of Science and consulting physician to the Sunderland Infirmary. His principal published works are: "A Monograph of the Recent British Ostracoda," in *Transactions of the Linnean Society* (1863); *A Monograph of the Post-Tertiary Entomostraca of Scotland* (1874); *A Monograph of the Free and Semi-Parasitic Copepoda of the British Islands* (1877-80).

BRADY, HENRY BOWMAN (1835-91). An English paleontologist, born at Gateshead. He was a successful manufacturing pharmacist and had much influence in placing that profession on a sound scientific basis. For several years he was member of the council of the Pharmaceutical Society. The associations of his youth had

developed in him a desire for research in natural history, and his life near the coast of the North Sea enabled him to gratify his tastes in that direction. He spent much time in dredging marine animals and became particularly interested in a group of minute organisms, the Foraminifera, concerning which he eventually was recognized as the chief English authority. He studied also the fossil members of this group of animals. The oceanic deposits collected by the *Challenger* expedition were turned over to him for examination, and the contained Foraminifera furnished the material for an extensive monograph, perhaps the most important ever published on that class of animals. He published several memoirs on the Foraminifera of the Mesozoic, Cenozoic, and recent deposits of Great Britain, and contributed freely to the scientific journals. He was elected a fellow of the Geological Society of London in 1884, of the Royal Society in 1874, and was also a fellow of the Linnean and the Zoological societies. His more important works are: *Report on the Foraminifera Dredged by H. M. S. Challenger, during the Years 1873-76* (2 vols., 1884); *Scientific Results of the Challenger Voyage*, vol. ix (1888), a magnificent work of over 800 quarto pages, with an atlas of 115 plates, "A Monograph of Carboniferous and Permian Foraminifera," *Transactions Paleontographical Society*, vol. xxx (1876).

BRADY, JAMES HENRY (1862-). An American public official and legislator, born in Indiana Co., Pa. He studied at the State Normal School at Leavenworth, Kans. In 1894 he moved to Idaho where he became president of the Idaho Consolidated Power Co. He also became president of the Western Development Association, and chairman of the advisory board of the National Council of Women Voters. In 1904-08 he was chairman of the Idaho Republican State Central Committee, and in 1909-11 was Governor of Idaho. He was elected United States Senator in 1913 to fill the vacancy caused by the death of Senator Heyburn.

BRADY, JAMES TOPHAM (1815-69). An American lawyer, born in New York City. He was educated by his father, who was also a well-known lawyer and judge. The son became eminent for his forensic eloquence and met with remarkable success as a lawyer, especially in criminal cases. In 1843 he was appointed district attorney of New York County and in 1845 corporation counsel of the city of New York. In 1860 he was the candidate of the proslavery Democrats for Governor of New York State. He contributed largely to newspapers and magazines, but left no collected works. Among his notable criminal cases was the defense of Gen. Daniel E. Sickles, on trial for killing Philip Barton Key.

BRADY, JOHN (1842-1910). An Irish-American prelate, born in county Cavan, Ireland. He studied at All Hallows College, was ordained priest in 1864, and from 1864 to 1868 was assistant pastor at Newburyport, Mass. In 1868 he became pastor at Amesbury, Mass. He greatly aided Archbishop Williams, of Boston, in the labors of that episcopate and was appointed auxiliary Bishop of Boston in 1891. In the same year he was consecrated titular Bishop of Alabama.

BRAEKELEER, brä'ke-lär, DE. A family of Belgian painters.—FERDINAND TIEBLEN (1792-1883), historical and genre painter, was

born in Antwerp and studied at the Academy there under Van Bree. His most important activity was as a teacher. Besides his sons and nephew, he numbered among his pupils such important artists as Leys, Alois Hunn, and Louis Somers. He began with large historical canvases, which he abandoned in favor of genre pictures, showing in their color the influence of the old Flemish masters.—HENRI DE BRAEKELEER (1800-88), born in Antwerp, was a pupil of his father and his uncle Leys (qv). He sought for inspiration in the old Dutch masters, especially Pieter de Hoogh, and emphasized rather the technical side than the subject of his paintings.—FREDYAND THE YOUNGER (1828-57), likewise a pupil of his father and of Leys, painted genre interiors of great promise, which an early death prevented him from fulfilling. The works of the Braekelers may be best studied in the museums of Brussels and Antwerp. Henri is also represented in Berlin and Hamburg. Consult Hymans, *Henri de Braekeler* in *Kunst und Künstler* (Berlin, 1905), C. Lemouner, *Henri de Braekeler et son œuvre* (Brussels, 1905).

BRAG (from *brag*, to boast, of the game of bluff). An old English game at cards, of which there are two varieties, single and three-stake *Brag*. The full pack of cards is used. The three bragger cards, in order of their value, are the ace of diamonds, the jack of clubs, and the nine of diamonds. All of the other cards rank as in draw poker. The braggers may be used as duplicates of any other card, but a natural pair, etc., ranks higher than one made with a bragger. The rules governing the game are those which control poker. Pairs and triplets only count. In *Three Stake Brag* each player puts up three equal (and invariable) amounts. The dealer deals to each player two cards, faces down, and then one card, face up. The highest turned-up card wins the first pool. The play then continues with the other two cards, the winner taking the second pool, when all the remaining hands are shown, the winning one being that whose spot value is nearer to 31, reckoning the aces at 11 and the face cards at 10 each. In *American Brag*, there are eight braggers, all of equal value, the jacks and nines of each suit, but a pair or triplets formed with a bragger outrank a natural. If a player raises a bet, and another player sees the raise, the two change hands, and the holder of the lower hand retires, returning the higher hand to the original holder. Consult Foster's *Complete Hoyle* (New York, 1909).

BRAGA, bra'ga (Lat. *Bracara*, so called from the tribe *Bracarii*). The capital of a district in the Portuguese province of Minho and seat of an archbishop, 33 miles west-northwest of Oporto (Map Portugal, A 2). It is an old town, antedating its colonization by the Romans. Surrounded by walls and towers and containing a number of old buildings, it still stands practically in its medieval form, in the midst of its modern suburbs. There are Roman ruins of a temple, an amphitheatre, and an aqueduct. The cathedral, originally built in the twelfth century and altered since then, contains a number of relics relating to the early history of Portugal, but is of little architectural value. There is also an archiepiscopal palace, with a fine library, and a number of smaller churches and monasteries. In the vicinity is situated the church of Bom Jesus do Monte, visited annually

at Whitsuntide by thousands of pilgrims. Braga is of some industrial importance, producing hats, arms, textiles, and gold and silver articles. Pop., 1890, 23,080, 1900, 24,300. Braga was the capital of Lusitania and the seat of two councils held in the sixth century at which the Arian and the Priscillianist heresies were respectively renounced. These councils mark the origin of the ecclesiastical greatness of Braga, whose archbishop is the Primate of Portugal, and long claimed supremacy (never acknowledged by the Cardinal Archbishop of Toledo) even over the Spanish church.

BRAGA, THEOPHILUS (1843-) A Portuguese philologist, poet, literary historian, philosopher, and statesman, born on the island of San Miguel, Azores. He studied law at the University of Coimbra and in 1872 was appointed professor of modern languages in the *Curso Superior de Letras* of Lisbon. He is the most important of modern Portuguese writers, known in his own country through his presentation of the positivism of Comte, his great history of Portuguese literature, and his militant democracy in politics. In his *Povo português no seus costumes, crenças e tradições* (2 vols., Coimbra, 1885), he presents a profound study of the Portuguese people and their relation to the Spanish people. Beyond Portugal he is best known for his investigation regarding the philology and literature of the Spanish Peninsula. His work in that field has been far too extensive wholly to escape a certain lack of exactness, yet his contributions to a critical knowledge of the subject have been noteworthy. From 1880 to 1886 he edited the periodical *O Positivismo*. After the overthrow of the monarchy he was provisional President of Portugal from Oct. 4, 1910, to the end of August, 1911. A much-abridged list of his works includes *História da poesia popular portuguesa* (1867, new ed., 1902), *História da literatura portuguesa* (32 vols., 1870-81, new ed., 10 vols., 1902, and a still later edition in some 30 volumes in course of publication in 1913), *Theoria da história da literatura portuguesa* (1872), *Manual da história da literatura portuguesa* (1875), *Traços geraes de philosophia positiva* (1877), *Soluções positivas da politica portuguesa* (1879), an excellent life of Camoens (1880), and a selection of poems, entitled *Alma Portuguesa* (1893), *Garrett e a sua obra* (1905). Consult T. Bastos, *Theophilo Braga e a sua obra* (Porto, 1893).

BRAGANÇA, bra-gan'sa. The name of two considerable towns in Brazil. 1. A seaport in the state of Pará, at the mouth of the Cato, which enters the Atlantic about 100 miles to the east of the Rio Pará estuary (Map Brazil, H 4). It is 110 miles northeast of Pará, with which it is connected by a railroad. Pop., 6000. 2. An inland city of about 17,000 inhabitants, in the state of São Paulo, 70 miles north of Santos, with which it is connected by rail, and about 200 miles to the west of Rio de Janeiro (Map Brazil, H 8).

BRAGANÇA. A city of Portugal, capital of a district in the province of Traz-os-Montes, situated in a pleasant and fertile district, on the Fervença, an affluent of the Sabor (Map Portugal, B 2). It is surrounded with walls and was the ancestral seat of the Dukes of Bragança (Braganza). There are some manufactures of silk and velvet. Pop., 1890, 5840, 1900, 5476. See BRAGANZA, HOUSE OF.

BRAGANZA, brăg'in'ză, HOUSE OF. A reigning house of Portugal, originally Dukes of Braganza (see BRAGANCA), represented through the female line in the exiled King Manoel. The first Duke was Alfonso de Portugal, a bastard son of King John I and Ines Pires. He was created Duke of Braganza in 1442 by his brother, Pedro de Portugal, acting as regent during the minority of Alfonso V. The sixth Duke, John, married Catherine, elder daughter of Edward, Duke of Guimaraens, a younger brother of John III. Catherine had better rights to the throne of Portugal than those alleged by Philip II, when in 1580 he took possession of Portugal. Sixty years later (1640) her lineal descendant, the eighth Duke John of Braganza, became King John IV of Portugal. Although the house of Braganza died out in the male line (after having founded the Imperial line of Brazil, which has also died out in the male line), its lineal descendants through the female line (house of Saxe-Coburg-Gotha-Braganza) continued to occupy the throne of Portugal until the expulsion of King Manoel II in 1910.

BRAGELONNE, brăzh'lün', LE VICOMTE DE, ou DIX ANS APRÈS. The title of a novel by the elder Dumas (1848), the last of the trilogy of which *Les trois mousquetaires* was the first.

BRAGG, BRAXTON (1817-76). An eminent Confederate general in the American Civil War. He was born in Warren Co., N. C.; graduated at West Point in 1837, and served in the Seminole War in 1837-39, and again in 1841-42. During the Mexican War he served under General Taylor, and for "gallant and distinguished conduct" at Fort Brown, Monterey, and Buena Vista was brevetted captain, major, and lieutenant colonel, respectively. He was on duty in various garrisons until January, 1859, when he left the service to become a sugar planter in Louisiana. From 1859 to 1861 he was commissioner of the Louisiana Board of Public Works. He joined the Confederate army on the outbreak of the Civil War, was made brigadier general early in 1861, and soon afterward was placed in command at Pensacola, Fla., of the Confederate forces which operated against Fort Pickens. He was promoted to be major general in February, 1862; joined the Army of Mississippi; took a conspicuous part in the battle of Shiloh (April 6-7); and, after the death of A. S. Johnston, was raised to the rank of general. On June 20, 1862, after the evacuation of Corinth, he replaced General Beauregard as commander of the Western Department, and in August, at the head of a force of 45,000, invaded Kentucky, with the intention of winning over that State to the Confederate cause. An exciting race for Louisville ensued between him and Buell, but Buell arrived first and by skillful maneuvering gradually forced him to retreat. The two armies met at Perryville, Ky., on October 8, and Bragg, defeated, withdrew hastily into Tennessee.

His apparent failure in this campaign brought upon him the bitter criticism of the South, and for a time his removal was seriously contemplated; but his campaign, according to Gen. T. A. Dodge, "had really placed him in a position in Buell's front far superior to the one he had occupied before he marched for the Ohio, morally and materially." At Murfreesboro, or Stone River, on Dec. 31, 1862, and Jan. 2, 1863, he was again worsted by the Federal army, now under Rosecrans, and fell

back upon Tullahoma. Out of this city, early in September, 1863, he was skillfully maneuvered by Rosecrans, whom, however, he defeated decisively in the great battle of Chickamauga (September 19-20). Soon afterward he was utterly defeated, in turn, by Grant in the three days' battle of Chattanooga (November 23-25), and, in deference to the growing dissatisfaction of his army, he was replaced by Hardee on December 2. On Feb. 24, 1864, he was summoned to Richmond, where, under the direction of President Davis, he was charged with "the conduct of military operations in the armies of the Confederacy." He was placed in command of the Department of North Carolina in November, and led an unsuccessful expedition into Georgia to cooperate against Sherman, then on his march to the sea. In February, 1865, he was assigned to active service under J. E. Johnston and remained with that officer until his surrender. After the war Bragg was for some time chief engineer for the State of Alabama and as such had charge of the improvements in Mobile Bay. He was a hard fighter, and as an officer was brave and resourceful; but he was also a stern martinet, was sometimes dilatory in his movements, and was frequently lax in supervising the execution of his orders.

BRAGG, EDWARD STUYVESANT (1827-1912). An American politician born at Unadilla, N. Y. He settled in Wisconsin, and was admitted to the bar of that State in 1850. From 1854 to 1856 he was district attorney for Fond du Lac Co., Wis. He entered the army as a captain in 1861 and was mustered out as a brigadier general in 1865. He was in Congress in 1877-83 and 1885-87, and in 1884 seconded the nomination of Cleveland, saying of him, "We love him for the enemies he has made." He was Consul General to the Cuban Republic from May to September, 1902, and held the same position at Hongkong from 1902 to 1906.

BRAGGADOCCHIO, brăg'gă-dŏ'chŏ (evidently from bragging). A character in Spenser's *Faerie Queene*, representing the twin vices of boasting and cowardice, and drawn from Ariosto's *Martano in Orlando Furioso*.

BRAGI, bră'gē, or BRAGE. In Scandinavian mythology, the god of poetry and eloquence, son of Odin and Frigga. According to the Older Edda he was the most perfect of all skalds, or poets, and the inventor of poetry, which is designated by a kindred word, *bragr*. One of the books of the Younger Edda is called *Bragi's Talk*. Unlike Apollo, who in the Greek mythology is represented as enjoying eternal youth, Bragi was supposed to be an old man with a long, flowing beard, and his brow was always mild and unwrinkled. Bragi's wife was Idun (q.v.). Together with Hermod he received and welcomed all those heroes who had fallen in battle on their arrival at Walhalla. On festive occasions, as well as at the burial of a king or earl, a goblet, called Bragafull (Bragi's goblet), was presented, before which each man arose, made a solemn vow to do some great deed worthy of being immortalized in verse, and emptied it. The Danish King Sweyn is said to have made such a vow before the invasion of England in 994. The myth of Bragi was probably developed from the earliest-known Norse skald of the same name, who lived c.800, and of whose fragmentary works there is an edition by Gering (Halle, 1886). Several German periodicals and other works intended to cherish a national spirit

have taken the name of Bragi. Consult Anderson, *Norse Mythology* (Chicago, 1901). See **ESB**.

BRAHAM, brá'am, JOHN (1774-1856) A well-known English singer, of Jewish descent, born in London. He had an unusually long professional career, having begun to sing on the stage at the age of 10. About the close of the eighteenth century he visited France and Italy for study. On his return to England he became remarkably popular, and from that time for half a century he was considered the greatest tenor in Europe. Sir Walter Scott considered him "a beast of an actor, but an angel of a singer." He created the rôle of *Huon* in Weber's *Oberon*. He also wrote incidental music to many plays.

BRAHE, bra or bra'a, TYCHO (1546-1601) A celebrated Danish astronomer, born at Knudstrup in Skåne, south Sweden, then a province of Denmark. He was descended from a noble family, originally Swedish, and was sent at the age of 13 to the University of Copenhagen, where he had not been more than a year when an eclipse of the sun turned his attention to astronomy. His uncle, who destined him for the law, furnished him with a tutor, and sent him to the University of Leipzig in 1562, but Brahe, who cared nothing for that study, devoted just so much time to it as would save appearances, and while his tutor slept busied himself nightly with the stars. By these surreptitious observations of the heavens, and with no other mechanical contrivances than a globe about the size of an orange and a pair of rude compasses, he succeeded, as early as 1563, in detecting grave errors in the Alfonsine and Prutenic tables and set about correcting them. The death of his uncle, who left him an estate, recalled him to his native place in 1565, but he very soon became disgusted with the ignorance and arrogance of those moving in the same sphere with himself and went back to Germany. He resided at Wittenberg for a short time, and then went to Rostock, where he lost part of his nose in a duel with a Danish gentleman, but for the lost organ he ingeniously contrived one of gold, that fitted so admirably, and was so naturally colored, that few could have detected that it was artificial. After a couple of years spent in Lüneburg he returned home, where in 1572 he discovered a new and brilliant star in the constellation Cassiopeia. In 1573 he married a peasant girl, which his fellow noblemen thought even more undignified than being addicted to astronomy, for thus they considered very degrading to a gentleman, whose only becoming qualification should be, in their estimation, skill in the use of arms. After some time spent in travel, Brahe received from his sovereign, Frederick II, the offer of the island of Hven as the site for an observatory, the King also offering to defray the cost of erection and of the necessary astronomical instruments, as well as to provide him with a suitable salary. Brahe accepted the generous proposal, and in 1576 the foundation stone of the castle of Uraniborg ('fortress of the heavens') was laid. Here, for a period of 20 years, Brahe prosecuted his observations with the most unwearied industry—with a zeal, in fact, sufficient to create a new epoch in astronomy as a science of observation. The scientific greatness of Brahe was no protection against the petty prejudices of the nobles, who could not bear to see honor heaped

on one who, according to their notions, had disgraced their order, nor against the meaner jealousies of physicians, who were annoyed at his dispensing medicine gratis to the poor. So long as his munificent patron, Frederick II, lived, Brahe's position was all that he could have desired, but on his death, in 1588, it was greatly changed. For some years under Christian IV, Brahe was simply tolerated, but in 1597 his position had grown so unbearable that he left the country altogether, having been the year before deprived of his observatory and emoluments. After residing a short time at Rostock and at Wandsbeck, near Hamburg, he accepted an invitation of the Emperor Rudolph II—who conferred on him a pension of 3000 ducats—to Benátky, a few miles from Prague, where a new Uraniborg was to have been erected for him, but he died at Prague on Oct. 24, 1601 (N.S.). At Benátky he had Kepler as his assistant, and to the advice of Brahe that celebrated astronomer owed much.

Brahe never fully accepted the Copernican system of the universe, and sought to compromise by combining it with the old Ptolemaic system. In the Tychoenic system the planets were considered to move round the sun, which, together with the stars, revolved about the earth, the latter remaining fixed in space. Brahe rediscovered the variation and annual equation of the moon first detected by the Arabian astronomer, Abul Wefā, and computed the earliest refraction tables. He may be said to have inaugurated the era of precision in astronomical measurement. Had it not been for the exactness of his observations, Kepler might have sought in vain for the three laws of planetary motion which are associated with his name.

The scientific publications of Brahe are numerous. His principal work, *Astronomiæ instauratæ Progymnasmata*, in 2 vols., ed. by Kepler, appeared at Prague in 1602-03. In his *Astronomiæ instauratæ Mechanica*, published at Wandsbeck in 1598, he gave a description of his instruments and an autobiographical account of his life and discoveries. Complete editions of his works were printed at Prague in 1611 and at Frankfurt in 1648. Consult Gassendi, *Vita T. Brahe* (Paris, 1655); Biewster, *Martyrs of Science* (London, 1841); Bertrand, *Les Fondateurs de l'astronomie moderne* (Paris, 1873); Dreyer, *Proetus of Scientific Life and Work of Tycho Brahe* (London, 1890); Lodge, *Pioneers of Science* (London, 1904); Bryant, *History of Astronomy* (London, 1907); Bigourdan, *L'astronomie, Evolution des Idées et des Méthodes* (Paris, 1911); *Tychonis Brahe Dani Opera Omnia*, Tom I, edited by Dreyer (Copenhagen, 1914).

BRAHMA, bra'ma. According to its commonest usage, the name of the Supreme Being, or Creator of the Universe, in the Hindu religion and philosophy. The Sanskrit word *brahman* itself has three distinct phases, which are important to note: (1) *brāhmaṇ*, neuter and accented on the first syllable, with nominative singular *brāhmā*, signifies exaltation, force, especially the power of prayer, devotion, worship, and later, holiness, spirit, the all-pervading essence of the universe, (2) *brahmān*, masculine and accented on the ultima, with nominative singular *brahmā*, denotes a personification of the latter, the Supreme Creator of the Universe, (3) *brahmān*, also masculine and similarly accented, denotes a priest, a Brahman. The first

two meanings alone are considered here; for the third see BRAHMANISM; CASTE.

In the *Rigveda* *brāhmā*, neuter, signifies only the power of prayer; in the later development of the Brahmanas and Upanishads (q.v.) it denotes the essence of the universe from which all created things are evolved and into which they are reabsorbed. The personified god *Brahmā*, masculine, is a deified form of this absolute spirit, and to know him is the step toward the higher knowledge of the impersonal and supreme soul. *Brahma* as a divine being represents creative activity, and he shares respectively with the other two members of the Hindu Trinity, *Vishnu* and *Śiva*, in producing, maintaining, and dissolving the world. As a formal triad this union is of later origin in the development of Hindu mythology. The attribute of creative activity is ascribed to various gods in the older Vedic period; but in the stage of the Brahmanas, the father god, *Prajāpati*, or *Brahmā*, appears as the individual creator. In *Manu* (q.v.), i. 1 et seq., *Brahmā* is described as self-existent and as evolving the world from an egg—the doctrine of the cosmic egg—and his existence endures for an æon that is practically eternal. The representations of *Brahmā* in Hindu mythology often show him as born in a lotus sprung from the navel of *Vishnu*. Five heads were originally assigned to him, but one was destroyed by *Śiva*. His color is red, and he rides upon a swan. The goddess *Sarasvatī*, or eloquence personified, is his consort. In the practice of the Hindu religion to-day *Brahmā* plays almost no part. *Vishnu* and *Śiva* have supplanted this too abstract god. But in the reform spiritual movement of the *Brahmo-Somāj* (q.v.), God is worshiped under the form of the ideal and supreme *Brahma*, which comprises the three manifestations of *Brahma*, *Vishnu*, and *Śiva*. Consult: Griswold, *Brahman* (New York, 1900); Löbbecke, *Ueber das verhältniss von Brāhmaṇas und Grāntasūtrien* (Leipzig, 1908); Milloud, *Le Brahmanisme* (Paris, 1905); Oman, *The Brahmins* (London, 1908); Tattvabhūṣan, *The Philosophy of Brahmanism Expounded with Reference to its History* (Madras, 1909). See INDIA; TRIMURTI, ŚIVA; VISHNU.

BRAHMAGUPTA, brā'mā-gūp'tā (born in 598). One of the most prominent Hindu mathematicians and astronomers. He wrote (628) the *Brahma-sphuta-siddhanta* (the 'Improved System of Brahma'), of which chaps. xii and xviii are on mathematics. Two other works by him are known, at least by title. *Brahmagupta's* mathematical chapters have been translated into English by Colebrooke (London, 1817).

BRĀHMAṆA, brā'h-mā-nā, THE. Second of the three grand divisions of Vedic literature, consisting of writings relating to prayer (*brāhman*) and sacrifice. These works, belonging to a much later period than the hymns, when the language had become obscure, represent the views of various teachers in regard to the interpretation of the text, the ritual, dogma, and the relation of the hymns to the sacrifice. In addition, a mass of legends, mythology, and speculations on philosophy and etymology produce a strange conglomerate, containing much that is absurd, but also much of value for the study of language and civilization. Attached to the *Brāhmaṇas* are two other classes of writing: the *Aranyakas*, containing instructions for the performance of the sacrifice by wood-dwellers, and the *Upanishads*. Of the preserved *Brāh-*

manas, the most important are the *Āitareya Brāhmaṇa*, attached to the *Rigveda*; the *Chandogya Brāhmaṇa*, with the *Chandogya Upanishads*; the *Ātharvaveda*, belonging to the *White Yajurveda*.

BRAHMANASPATI, brā'mā-nā-spāt'i. See BRIHASPATI.

BRAHMANISM, brā'man-iz'm, is the religion of the Brahmins, the priestly caste among the Hindus. Brahmanism professes to be the religion of the Veda (q.v.), and, as the Veda regulates the legal, social, and political life of the Hindus, the history of Brahmanism is to a large extent identical with the history of Hindu civilization. (See INDIA.) The present article is, however, mainly concerned with the religious aspect of Brahmanism. The roots from which the Brahman religion has sprung are numerous: magic practices, ancestral cult, belief in the soul and spirits were combined with theosophic and philosophic speculation and deliberate myth-making. These beliefs crystallized around a special ritual fostered by the Brahmins. The *Veda*, their holy writ, reflects therefore all these numerous and partly incongruous elements, and their import may be understood only in the light of the historic evolution of the Veda.

In a broader sense the *Veda* embraces the whole of the "revealed" or canonical literature of the Brahmins. With a more restricted meaning it applies only to the first four constituents of that canon, the *Rigveda*, the *Sāmaveda*, the *Yajurveda*, and the *Ātharvaveda*. The earliest of these is the *Rigveda*, which in some portions antedates considerably the first millennium B.C. It is composed of "verses," or "songs," containing invocations to the gods, many of which have great beauty, and is the earliest text written in an Indo-European tongue. The tenth and last book of the Veda is much posterior to the others—a fact which must be borne in mind if we wish to understand properly the trend of the religious development of India. The *Sāmaveda* consists almost wholly of stanzas borrowed from the *Rigveda* and arranged in the order in which they are chanted in the Soma sacrifice. The *Yajurveda*, too, is indebted to the *Rigveda*, but it also contains original formulas arranged in the order of various sacrifices. The *Ātharvaveda* is largely a collection of exorcisms and incantations against evil spirits. This Veda seems to have been adopted into the canon after some hesitation, and may mark the first concession made by the priests to the religion of the masses. These four metrical books constitute the Veda par excellence. Appended to each of these Vedas are other treatises, written in prose and purporting to explain the Vedic text and the ritual. Because they deal with prayer (*brāhman*), they are called *Brāhmaṇas*. They are considerably younger than the *Rigveda*, being written in an age when the four main castes had been already established. For this reason they lay stress on the importance of the Brahman and the sacrifice performed by him. The final portions of the *Brāhmaṇas* are called *Aranyakas*, or 'forest books,' since, owing to their peculiarly sacred character, these texts must be studied in the solitude of the forest. The final portions of these again constitute the *Upanishads*, or 'esoteric treatises,' and contain lofty metaphysical speculations on the nature of the soul of the universe (*Ātman* or *Brahma*). They are younger than the *Brāhmaṇas* and, from their position at the end of the Veda, are also called

Vedānta, a term which has come to mean the 'final goal of the Veda' and is also given to a school of pantheistic philosophy, which bases its teachings on the Upanishads. All the treatises thus far enumerated partake of revelation (*śruti*) and constitute the Veda in the wider meaning of the word.

Less authoritative than the Veda are a number of works viewed as embodying sacred 'tradition' (*smṛti*). These words are later than the Veda literature, being contemporary with the establishing of the Buddhist and Jain religions. In the first place come the *Sātras*, compendious manuals dealing with sacrifices (*śrauta-sūtras*), domestic rites (*grhya-sūtras*), or containing moral and legal commentaries (*Dharma-sūtras*). The last are the precursors of the *Dharma-sūtras*, which are still accepted as law in India, and the most famous of which is the code of Manu, or *Mānava Dharma-sūtra*. The two great epics, the *Mahābhārata* and the *Rāmāyaṇa*, also come under the head of *smṛti*, not only on account of their prodigious quantity of religious lore, but also because they are regarded as allegorical expositions of religious dogma.

The formation of the great popular religions of Vishnu and Śiva marked a new order in the spiritual history of India. The great epics and the old collections of religious lore, known as *Purāṇas*, underwent a revision in accordance with the new beliefs. The religious literature of India, instead of coming to an end, received a new impulse and led to the production of a tremendous mass of commentaries and super-commentaries, of allegoric and mythological poetry, and of philosophic treatises, all purporting, almost without exception, to be in agreement with the teachings of the Veda, but in reality connected with it by too slender a thread to deceive us. It is better to leave this literature out of consideration, since it reflects the spirit of modern Hinduism, and to consider as Brahman literature proper the Vedas and the *smṛti*. Accordingly we distinguish in this literature a Vedic and a post-Vedic age.

The gods (*devas*) of the Vedic period are personifications of the natural phenomena. No attempt was made at the outset to determine the relations of these divinities to one another. At a later epoch, however, a grouping was attempted, based on the threefold division of the Indian cosmos (*triloka*), and the gods were divided into three classes: (1) Celestial *Vasava* (the all-embracing heaven), the solar deities, *Aditya*, *Sārya*, *Savitr*, *Mitra*, *Pāśan*, *Vishnu*, who as yet was a minor god, and the goddess *Ushas* (the dawn), etc. (2) Aerial *Vāyu* (the wind), *Indra* (the lightning), *Rudra* (the thunder and father of the winds or *Maruts*), etc. (3) Terrestrial *Agni* (the fire), *Soma*, etc. Demons were known and feared, for instance, the dragon *Vṛtra*, enfolding the dark clouds, whom Indra strikes with his thunderbolt, *Vāta*, the goblins, *Rakshases*, etc. Among heroes peculiar importance attaches to *Yama*, who first discovered the way to the other world. The cow was held in reverence, and it has ever been considered a sacred animal in India. The Aryans also worshiped plants, such as sacred trees and, above all, the *Soma* (Avestan *Haoma*), the juice of which was drunk and offered in sacrifices. The cult of the ancestors required a perpetual domestic fire, before which rites were performed. The *Ātharvaveda* emphasizes incantations and exorcisms, in short,

magic or sorcery. As yet, although the souls of the dead are said to continue in the next world, in the land of *Yama*, there is no clear indication of the doctrine of retribution after death, and no evidence of the belief in transmigration, which was later destined to play a capital rôle in the history of the Hindu religion.

By what process did this polytheistic and naturalistic religion acquire the monistic and pantheistic traits of a later age? Several circumstances have contributed thereto. One of these was the tendency to establish the rudiments of a divine hierarchy, by assigning to one divinity in each of the three classes of gods a supremacy over the other deities of the same class. Thus the *Rigveda* already knows the triad *Sāya-Vāyu-Agni* (Sun-Wind-Fire). In the later Vedas and the Brahmanas, *Vāyu* was replaced by *Indra*, and in this manner the triad contained the three fiery elements of the sun, lightning, and fire. Now the fire had already been declared to be essentially one, despite the apparent multiplicity of terrestrial fires. From this to conclude that, in a certain higher sense, the three divinities were one, there was but a step. What led to this step is the further circumstance that the epithets and functions of the Vedic gods are more or less interchangeable and may be applied to several divinities. This tendency to identify the gods who present some points of similarity is frequently met with, *Agni*, for instance, being, in the *Rigveda*, expressly identified with *Indra* and *Varuna*. Free rein was thus allowed to the priests and poets to perceive the most far-fetched analogies, and in this way speculation influenced popular belief. Thus from the *Soma* juice being described as "celestial" and "brilliant" and compared in the sacrificial bowl with the moon in the waters, it was actually identified with the moon, and this belief was shared by the people.

A third factor which aided this line of thought is to be sought in the ease with which abstractions are personified in the Brahmanic literature. Thus we have *Aditi*, 'freedom', *Śraddhā*, 'faith', *Kāma*, 'love', *Brahma*, 'prayer', as independent divinities. Peculiarly adapted to this process are the *nomina agentia*, such as *Dhātṛ*, 'the creator, and the epithet applied to deities. Thus *Śiva*, 'auspicious', an epithet of *Rudra*, became the name of a god, other epithetic names are *Prajāpati*, 'lord of creatures', *Brhaspati*, 'lord of prayer', both important names in the history of Brahmanism. The occasions for the identification of the gods were thus multiplied, and when one of these divinities was hailed as the absolute, the others could be simply considered as predicates of the chief divinity. The idea of the gods' being but various names of a unique supreme being is expressed in the famous "creation hymn" of the tenth book of the *Rigveda*. At the origin, it is there said, "there was neither death nor life, neither night nor day, appeared. The One breathed calm and windless, and beyond it there was no other being." This doctrine received additional strengthening in the *Āraṇyakas* and the Upanishads.

A pantheistic tendency contended for supremacy with the monotheistic. The seven cosmogonic hymns of the same book of the *Rigveda* describe generation as a development, or unfolding, of the universe from a divine being called *Purusha*, 'self or man'. *Prajāpati*, 'lord of creatures', *Viśvakarman*, 'the all-maker', and *Hvanyagarbha*, 'the golden embryo'. While

these divinities were by some regarded as representing the same deity under various aspects, others identified the world with God, or spoke of Puruṣa as the cosmic soul, or universal Ātman. The monotheistic tendency is visible chiefly in the Brāhmaṇas, whereas pantheism finds expression in the Upanishads. But the same divinities are at times understood in a monistic, at others in a pantheistic sense. Thus *Puruṣa*, 'the self,' or the primeval man-giant, of the Rigvedic "Hymn of Puruṣa," is also declared to be "all this world, what has been and shall be." In the Brāhmaṇas he is identified with Prajāpati, the personal creator and lord of the third world, while in the Upanishads he is said to be the same as the universe, Ātman. In the Sankhya philosophy Puruṣa is the 'soul' as opposed to 'matter.' A similar history obtains for Ātman ('breath,' afterward the 'cosmic soul'), which was identified in the Upanishads with Brahman. It was this god who was destined to reconcile the conflicting monotheistic and pantheistic tendencies of the later Vedic speculation, although how far this reconciliation goes is a matter of individual opinion.

Already in the Rigveda we find three classes of priests: the reader (*hotr*), the singer (*udgātṛ*), and the officiating priest (*adhvaryu*). The Vedic word for both worshiper and priest is *brāhmān* (masculine; nom. Sing., *brāhmā*), and is in this sense found 46 times in the Rigveda. There is as yet little indication of a special caste of Brahmins, the word *brāhmaṇa*, 'man of the first caste' occurring only eight times. The Vedic 'prayer' or 'formula' is also *brāhmaṇ* (neuter; nom., sing., *brāhmā*). The word *brāhmā* also means 'devotion, worship,' in the abstract sense and also 'the sacredness of *brāhmān*,' as manifested in priest and prayer. This sacred character of prayer was personified and worshipped under the name of *Bṛhaspati*, 'lord of prayer.' This god followed the evolution of his earthly representative, the Brahman priest, and as it became customary for rājās to have a chaplain or *purohita* to perform the sacrifices, the god *Bṛhaspati* became the *purohita* and the teacher (*guru*) of the gods. But even this god was destined to give way to a personification of Brahman (*Brāhmā*), which retained for the god this very name.

The word *brahma* connotes a 'magical power' lurking behind prayer or sacrifice; by means of prayer or sacrifice the gods are not so much requested for assistance as actually compelled to do the bidding of the officiating priest. From this stage there is but a step to another, in which the word *brahma* is conceived to include the all-pervading power of sacrifice, hence 'universal order' or 'holy rule.' "Through Brahman (formula) are heaven and earth held together," therefore Brahman rules the world. The god Brahman was therefore recognized. In the Brāhmaṇas this divinity was fully established, and in the Upanishads it is identified with the vital principle which permeates the universe (Ātman). We are thus brought to face a divinity which, under the same name, has a double function. Under one aspect it is impersonal (*brāhmā*, neuter) and designates the 'universal power of prayer and sacrifice'; from another point of view it is personal and designates the ruler of the universe (*Brāhmā*, masculine). Nothing more natural than to identify the two and, this being done, to fuse around this divinity the attributes and functions of Puruṣa,

Ātman, Prajāpati, Bṛhaspati, and the other ruling and creative deities. When the doctrine of transmigration came to be firmly rooted in the Hindu mind, *Brāhmā*, the god in the personal aspect, was regarded as an incarnation of *Brāhmā*, the impersonal divinity. Speculation as to the nature of Brahman took also another direction: As the individual breath or ātman is but a particle of the cosmic Ātman, the Brahman worshiper became a part of divinity. Says the Chhāndogya Upanishad, in speaking of the Ātman: "This whole world consists of it: that is the Real, that is the Soul, that art thou (*tat tyam asi*).'" And the *Bṛhadāraṇyaka* says: "whoever knows this 'I am Brahman' (*Aham brāhmāsmi*) becomes the All. Even the gods are not able to prevent him from becoming it. For he becomes their self (Ātman).'" When the doctrine of the transmigration of the soul became an all-admitted truth, when in consequence thereof the incarnation of the gods became one of the firmest tenets of Hindu belief, the barriers between men and the gods did no longer look impassable, and the Hindus believed that, through the instruments of doctrine, sacrifice, conduct, or asceticism, they could be raised to the rank of divinities and thus approach the final goal of Hinduism, the loss of individuality in the all-pervading Brahman or, as with the Buddhist, in the Nirvāṇa.

The code of Manu relates that the universe lay in a chaotic state; differentiation was brought about by the divine spirit or intelligence; this created the waters by meditation, and, from this water impregnated with the divine force, sprang out the *Hiranyagarbha*, or 'golden embryo,' which is already mentioned in one of the Rigvedic hymns. From these the male *Brāhmā* was born, the progenitor of all beings. He is therefore both *Śvayambhū* ('self-born') and *ajā* ('unborn'). It took centuries to accomplish this evolution of the divinity *Brāhma*, and the code of Manu, in which a definitive place was assigned to Brahman in the Hindu cosmogony, is posterior to the advent of Buddhism and marks the final step in the history of Hindu caste (*varṇa* or *jāti*).

A few words are necessary in connection with the history of the Brahman caste. When the Aryan people settled in India, the well-known division into *Brāhmins*, or priests, *Kṣatriyas*, or warriors, and *Vīśas* (*Vaiśyas*), or merchants and agriculturists, was not a hard and fast one. The consciousness of forming one Aryan people must have held these classes together and reminded them of the necessity of uniting their forces against the dark-skinned native populations of India (*Dāsas*). The word for caste in Sanskrit is *varṇa*, 'color,' and it is likely that the term was first used to distinguish the Aryan from the non-Aryan. The *Vaiśyas* were the whole people as opposed to the aboriginal *Dāsas* or *Dasyus*. Just as to-day the members of the Brahman caste may, and do, exercise any of the "clean" professions, it is possible that originally the Aryan householder might, if he wished, choose the profession of arms, or priesthood, or agriculture, as a means of livelihood. There is nothing in the early Vedic literature to make it certain that marriage with the lower classes of society was forbidden. But towards the end of the Vedic age a change came into being. The aboriginal populations which were thrown into submission by the Aryans were considered as forming a caste of serfs (*śūdra*), which it was

dishonorable for the Aryans to enter. At the same time the differentiation between the priests and the Vaisyas became more marked, and the priests were led to consider themselves superior to the rest of the people and to form a caste of their own. The Vaisyas were to serve both Brahmins and Kshatriyas. This situation is, to a certain extent, paralleled by the division into patricians and plebeians which obtained in ancient Rome. It is probable that their example was followed by other groups of people, as castes and subcastes are now numbered by the hundreds in India, and new castes are formed under our very eyes, being determined by descent, nationality, occupation, and change of occupation, crossing, migration, religion, and other factors of secondary importance. Although there is a nice gradation in the relative situation of the various castes, and despite the fact that the lower castes show consideration to the higher, an esprit de corps binds together the members of the same caste, who are just as jealous of their own privileges as the Brahmins are of theirs. The early portions of the Rigveda know of no sharply drawn caste divisions. It is in the *Purusha Sūkta*, or 'Hymn of Purusha' (*Rigveda*, x, 90), that mention is made of the four main castes, *Brahmanas* (priests), *Rājanyas* (warriors), *Vaiśyas* (agriculturists), and *Sūdras* or seifs, as having respectively sprung from the mouth, the arms, the thighs, and the feet of Purusha. In the *Brahmanas* and the *Sūtras* we are able to follow the progress of the Brahman caste which was definitively sanctioned in the code of Manu.

In the Vedic age the organization of society was patriarchal, and consisted of families united in class, under the rule of a king or rāja. The head of the family had full power over the other members. In the clan (*gotra*) intermarriage was forbidden, and when the caste system was fully established no marriage was legal outside of one's own caste, but girls could marry into superior castes, their progeny would belong, however, to a mixed caste. The great religious function of marriage was to continue the family rites (*samśkāras*). The most important of these rites is the *upanayana*, or religious initiation. When he reached the proper age, the boy of the three upper castes had a sacred cord wound over the left shoulder and under the right arm and was conducted to a *guru*, or teacher of the Veda and the rites. After being initiated, he was expected to invoke the sun every morning and evening, in a prayer called *Sāvitrī*, and this ceremony was considered to be equivalent to a rebirth or spiritual bath. It is for this reason that the members of the three upper classes are called *dvijas*, 'twice born.' Other important rites are those of expiation, of marriage (*vivāha*), death, and the cult of ancestors (*śrāddha*). When the bridegroom led the bride from her father's house to his own home, he also brought the fire which was used for the marriage ceremony and thus established his own domestic fire. Before this fire (*gāhapatya*) were performed the rites and the five daily offerings. Other rites are of a ceremonial nature and call for the employment of several Brahmins. The most frequent of these *Śrauta* rites is the *Soma* sacrifice. Another is the *asvamedha*, or horse sacrifice. These rites are beyond the means of the poor, and, through the remuneration and honor they brought to the priests, they have contributed more than any-

thing else to the elevation of the Brahman caste. The *Sudras* are, of course, excluded from the performance of sacrifices, and they cannot even meet a Brahman without contaminating him. For the Brahman who wishes to attain beatitude, the following course of life is laid out. From the time of initiation to marriage he is to be a *brāhmachārin*, or religious student, upon marrying he enters the stage of *gṛhastha* (*gṛhapati*), or householder. When the householder 'perceives his skin to have become wrinkled and his hair gray, when he sees the son of his son,' he is ripe for the stage of *vanavāsin* (*vanaprastha*), or anchoite. When he has succeeded in extinguishing all earthly passions, he is to enter the condition of *bhikṣu*, or religious mendicant. This course of life lay also open to the other twice-born men.

Brahma has always preserved the mark of his origin in a priestly abstraction. He never became a popular god, just as his religion remained that of a privileged caste and not a universal religion, like Buddhism or Jainism. Brahma was regarded as an imperturbable divinity who held aloof from this world, while the real divine agencies governing this world were to be found in Vishnu, Śiva, Kṛṣṇa, Devī, and other popular gods. The *trīmūrti*, or Hindu Trinity, Brahma-Vishnu-Śiva, which appeared in the fifth century A.D., seems to be a compromise by which the Brahmins placed their god at the head of the two modern Hindu divinities in order to insure his nominal supremacy, while the other two godheads were to be the actual rulers of the world. In this way Brahman theology was enabled to consider Vishnu and Śiva as emanations of Brahma, but other beliefs acknowledge a duality (Vishnu-Śiva or Hari-hara), or even an identity of the two gods.

The time when these two divinities began to have a cult of their own is not known. But very likely this happened before the apparition of Buddhism and Jainism. The epic and the Purānas testify that these cults were old at the time of their redaction. In the third century B.C. the Greek Megasthenes, who has left a description of India, tells us that the cult of Dionysos (Śiva), the more ancient of the two, had flourished chiefly in the mountains, whereas the inhabitants of the plains adored Herakles (Vishnu).

These two great divinities are not unknown to the Veda. Vishnu is mentioned a few times in the Rigveda by his very name, and is a personification of the solar luminary, which in its daily course traverses the three worlds with three steps,—a metaphor which proved the starting point of the doctrine of *avatāras*, or divine incarnations under various forms. He assumed a more prominent position in the Yajurveda, in which he is constantly identified with the sacrifice. Śiva, 'the auspicious,' is the epithet given in the Rigveda to the terrible Rudra, the 'roaring' thunder god and the father of the winds or Maruts. That epithet was given for fear of vexing this terrible divinity, whose malevolent character has been retained in Hinduism. The Yajurveda knows him as Śiva, and in the Epic his importance is such that he is called *Mahādeva*, the great god. Śiva is also god of generation and seems to be in this respect a continuation of the Vedic Pūshan. One of his attributes is the phallus (*liṅga*), which is the object of a widespread worship. In his festivals dramatic performances took place, Śiva having

come to be considered, under the name of Ganeśa, the god of drama.

The post-Vedic divinities are distinguished from their Vedic predecessors by several traits which have largely their origin in the Veda, but which attained full development in the subsequent epoch. The most obvious of these traits is the anthropomorphic and individualistic character of the gods, each of which has a shape, attributes, and a biography of his own. As a partial offset to this we meet with another trait, which originated in the curious admixture of pantheism which we already noticed, but which now takes the form of the doctrine of incarnation. According to this view, while each divinity possesses its own individuality, it may nevertheless be an incarnation of one of the higher gods, Vishnu or Śiva. In this way local cults can subsist side by side. The avatāras, or incarnations of Vishnu, are peculiarly important, the Mahābhārata knowing no less than 1000 names of this divinity, which may be considered his incarnations. The most popular of Vishnu's incarnations is *Kṛṣṇa*, the 'black god,' the chief deity of the *Bhāgavata-Purāṇa*; other incarnations are *Arjuna*, the hero of the Mahābhārata, and *Rāma*, the hero of *Rāmāyaṇa*; *Vāsudeva*, etc. The famous poem *Gītāgovinda* sings the love of Kṛṣṇa for the beautiful cowherdess *Rādhā*. This example found many imitators, for the doctrine of incarnation easily lends itself to poetic elaboration; and poetic mythology and allegory may be considered as characteristic of the post-Vedic age. The obscurity of many of these legends did not detract from their popularity.

Female divinities were known in the Vedic age, but the Vedic goddesses do not have the prominence of their male companions. In the post-Vedic age it became the rule to associate a female deity (*śakti*) with each male god. Vishnu's companion is the gracious *Lakṣmī*, or *Śrī*, the goddess of beauty and wealth, while the consort of Śiva is known by several names, such as *Rūdrānī*, *Uṃdā*, *Bhairavī*, *Kālā*, *Pārvatī*, *Durgā*, *Kālī*, or simply *Devī*, and is even more wicked than her husband. Brahma himself is associated with *Vāch*, or *Sarasvatī*, the goddess of speech, learning, and understanding. The Vedic divinities, although not so popular as the new deities, continued to be invoked in prayers, since the Vedic texts or *mantras* and the ritual connected with them were retained. An elaborate mythology made up for their loss in popularity. The eight more prominent were called *Lokapālas*, 'world guardians,' and were assigned to preside over the cardinal and the intermediate points of the compass: *Indra*, their chief, over the east; *Agni*, over the southeast; *Yama* over the south; *Sūrya* over the southwest; *Vāruṇa* over the west; *Vāyu* over the northwest; *Kubera* over the north; and *Soma* (or *Chandra*) over the northeast. The abode of these gods is the heaven of Indra, the middle world (*svarloka* or *svarga*). At the same time some of the old gods underwent a change in function, and a host of new divinities shared with them the Hindu pantheon. *Kāma*, the old love god, is represented with bow and arrows of flowers and bowstring of bees. The sacred river Ganges was worshipped as the goddess *Gāṅgā*. *Yama*, the Vedic King of the dead, has now become the god of the lower world and the judge of the dead. *Skanda* is the general of the celestial armies. *Ganeśa*, the son of Śiva and Pārvatī,

has the head of an elephant and is the god of wisdom; *Dharma* was the god of justice, etc. Demigods are numerous, such as *Nārada*, the messenger of the gods; the *Gandharvas*, the heavenly musicians, already known to the Rigveda; the fair *Apasaras*, scarcely mentioned in the Rigveda, whom Indra employs to seduce the holy men that threaten his supremacy by their ascetic exercises; the malicious *Rakshases*, etc. The demons of this epoch (*Asuras*, *Datyas*, *Dānavas*) are very numerous and wicked. Serpents (*Nāgas*) were adored, and the sacred character of the cow was established beyond doubt. A mythological cow, the *Kāmaduhī*, or cow of plenty, is frequently alluded to in literature. Bulls were dedicated to Śiva in his capacity of god of generation. Statues and images of the gods were reverently worshipped. The men who excelled in piety were revered as saints; and this reverence was extended to their works or relics.

The new beliefs, unknown to the Veda, are quite common in the post-Vedic age: the doctrine of the transmigration (*samsāra*) of the soul and the doctrine of *Karma*. The latter holds that the consequences of one's actions are not destroyed by the death of that individual, but still persist and determine the fate of the soul in the other world. This idea was connected with the belief in the soul's persistence after death and the doctrine of transmigration took shape. In the Upanishads it is said that the righteous ascetic, who, moreover, possesses the right knowledge, enters after his death the "path of the gods" (*devayāna*), which finally leads to absorption in Brahma, while the householder who has performed right sacrifice enters the "path of the fathers" (*pitryāna*) and dwells in the moon until his *karma* is worked out. After this he is born again in this world, first as a plant and afterward as a man of the three higher castes. The wicked are born again as outcasts or unclean animals. By the time of the Epic this belief was universal. (See BUDHISM; METEMPSYCHOSIS.) With the belief in transmigration was associated the belief in hell, where the wicked are punished for their evil deeds.

Pilgrimages, sacrifices, expiatory ceremonies, exorcisms, incantations, and all kinds of magic practices were very common in this period. The cremation of widows (*sati*), which was not known in the Vedic time, became a sanctioned practice, as the wife's position in the family diminished in influence.

Pursuant to the belief in transmigration, the idea was entertained that man is not radically different from the gods, but that man and god are both steps in the infinite scale of beings, the gods being nearer the final goal (Brahma). Far from believing that our world was the only reality, many held that it is a mere illusion (*māyā*), which it is better to dispel. To shorten the *samsāra* and thus to come nearer the final rest became the transcendent purpose of our life. The Hindu sought deliverance or "enlightenment" (*mukti*, *moksha*) in various ways, some believing in the efficacy of rites and expiatory ceremonial, others in asceticism and self-chastisement (*yoṅa*), others still in the possession of true knowledge and the freeing of the soul from all desire, while the mystics sought deliverance in the love of god (*bhakti*). In their pursuit of deliverance the followers of Buddha and Mahāvīra left the narrow religion of the Brahmans

for the universal religions of Buddhism and Jainism. Between the amoral god of the Brahmins and philosophers and the immoral gods of the people the thinking Hindu could not reach a satisfactory choice. A few superior spirits among the Brahmins, like the great Śaṅkara Acharya, perceived this and inaugurated a movement of religious reform which has enabled Brahmanism to hold its ground to our time. See HINDUISM.

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BRAHMAPUTRA, bra'ma-puṭra (Skt. *Brahma* + *putra*, son, offspring). A river of Asia, rising as the Sampo, on the table-land of Tibet, in about lat 30° 30' N and long 82° E. Its source, which is near to the headwaters of the Sutlej and Ganges, lies at an elevation of nearly 16,000 feet. The stream takes a general easterly course to beyond the 94th meridian, when, as the Dihong, it is deflected southward, traverses the Himalayas, and enters upon the lowland plains of Assam. Its identity with the Sampo and Dihong, though long undoubted, was not actually demonstrated till 1913. Shortly after leaving the mountains it receives from the east the Lohit or Brahmakunda, which was for a long time considered to be the main river. In lat 25° 10' N and long 89° 43' E. it throws off the Konaie, and after a course of 180 miles is named the Megna. Ninety miles from the sea it combines with the Ganges in cutting up their common delta into a network of inland navigation. A regular steamer service is maintained between Calcutta and Dibrugarh, 800 miles up the river, and vessels of large burden can ascend as high as Gauhati. Total length, about 1800 miles. Consult Williamson, "The Lohit-Brahmaputra" in *Geographical Journal* (London, 1909).

BRAHMO-SOMAJ, bra'mō-sō-maj', or, better written, BRAHMA-SAMAJ (Hind. *Brahma*, Skt. *Brahmā*, *Brahma*, prayer + *samaj*, assembly for worship) (*Theistic Church*). A religious and social association in India, originated by the cele-

brated Hindu Rajah, Rammohun Roy (q.v.), in 1828, under the title "Society of God." At first the service of the society was divided into four parts: the recitation of texts from the Vedic hymns, the reading and translating into Bengali of passages from the Upanishads, the delivery of a sermon in Bengali, and the singing of hymns accompanied with instrumental music. Only Brahmins were allowed to lead in the service. The conversion of Debendra Nath Tagore, a rich Brahman of Calcutta, in 1841, gave the movement a strong impetus, which, with the spread of English education, succeeded in emancipating it from Vedantism. The third stage in the development of the Brahma-Somaj took place under Babu Keshub Chunder Sen, who joined the church in 1857. The aim of Sen and his followers was to apply the principles of the sect to practical every-day life, and under his direction the more progressive members withdrew from the original organization and formed the "Brahmo-Somaj of India." Their fundamental beliefs are as follows. That there is but one supreme God, the object of worship, that nature and reason are the sources whence we derive our knowledge of God, and that religion allows progressive development. They have renounced all the distinctions of the caste system with which India has so long been fettered, and they consider all men as equally the children of God, they have given up all the old Vedic and Brahmanical sacrifices, they believe in no sacred books or places, but accept whatever is true and good in any religion. In 1880 there were 149 *somajes* scattered throughout India, and of these 44 have *mandirs*, or places of worship. They have established schools and have published at different times 18 periodicals, of which 6 were in English, 9 in Bengali, and 3 in minor vernaculars. They have reformed the abuse of child marriage and have done much to promote female education. In 1878 some of Sen's followers who disapproved of certain of his tenets, and of his conduct in marrying his daughter at the age of 13 to a Hindu maharajah, seceded and formed the Sadharan (or Universal) Brahma-Somaj, which soon took the first place among the theistic churches of India. Their creed was the same as that of the original Somaj with the addition of the following articles: the brotherhood of men, the immortality of the soul, and that the punishments of God are remedial and not eternal. The Arya-Somaj, founded by Dayananda Sarasvati (died 1882), differs from the Brahma-Somaj in considering the Vedas as divine revelation in which everything true and useful, even the recent discoveries of science, could be found. Consult *Brahmo Dharma, or Religion of the Brahmos* (1850), Keshub Chunder Sen, *Indication of the Brahma-Somaj* (Calcutta, 1860), Ghose (editor), *Works in English of Rammohun Roy* (2 vols., 1885-87), *The Autobiography of Maharshi Devendranath Tagore*, translated from the Bengali by Satyendranath Tagore (Calcutta, 1900), F. Lillingston, *The Brahma-Somaj and Arya-Somaj* (London, 1901), Mozoomdar, *Life and Teachings of Keshub Chunder Sen* (Calcutta, 1887), F. Max Müller, *Ramānirishma His Life and Sayings* (New York, 1899), id., *And Lang Syne, Second Series* (New York, 1899), and the *Theistic Quarterly Review*, the official organ of the Brahma-Somaj, published in Bengal since 1880.

BRAHMS, brāms, JOHANNES (1833-97). One of the supreme masters of music. His grandfather had been a carpenter, and his grand-

father an innkeeper. The latter's second son, Johann Jacob (1806-72), early showed a decided talent for music, which he cultivated in spite of his parents' opposition. In 1826 he settled in Hamburg, where for many years he played the double bass in the orchestra of the Stadtheater. In 1830 he married Johanna Nissen. Of this union three children were born, of whom Johannes, born May 7, 1833, was the second.

The elder Brahms regarded it as a matter of course that his son should follow the profession of music, and accordingly Otto Cossel was chosen as a teacher. The boy's talent was so evident and his progress so rapid that at the age of 10 he was placed under the instruction of Eduard Marxsen, at that time the foremost musician of Hamburg. That his creative talent must have manifested itself with extraordinary power we may gather from Marxsen's words when he heard of the death of Mendelssohn: "A great master of music has passed away, but a greater one will arise in Brahms." This was in 1847. In the same year the boy made his first public appearance as a pianist, but he still continued his studies under Marxsen. Unfortunately nothing has been preserved of his earliest compositions. In all probability Brahms destroyed them, as he later on always burned compositions which he did not think worthy of publication.

When in 1853 Remenyi (q.v.) visited Hamburg, Brahms joined him for a concert tour, appearing as accompanist, soloist, and composer. Whatever plans the young men may have had, they were suddenly changed by the meeting with Josef Joachim (q.v.) in Göttingen. The great violinist was so deeply impressed both by the playing and the compositions of Brahms that he recommended him to Liszt (q.v.) in Weimar, where the young musician spent six weeks as Liszt's guest. But in spite of his host's amiability Brahms did not find the musical atmosphere of Weimar congenial, and he returned to Göttingen to Joachim. In the beginning of October, 1853, Brahms, bearing a letter of introduction from Joachim, called upon Schumann in Düsseldorf and played for him the works in manuscript now known as op. 1, 2, 3, 4, 5. Before the month was out there appeared in the *Neue Zeitschrift für Musik* Schumann's famous essay, "Neue Bahnen." But that was not all. The article was immediately followed by an enthusiastic personal letter to Breitkopf and Härtel, the result of which was the publication by that famous firm of Brahms' Sonata in C, op. 1; Sonata in F♯m., op. 2; Six Songs, op. 3; Scherzo in E♭m., op. 4. Almost simultaneously B. Senff published the Sonata in Fm., op. 5, and Six Songs, op. 6.

One might think that after such an introduction Brahms would have no difficulty in gaining recognition. Quite the contrary is true. All musical parties assumed an attitude of critical reserve. Only the immediate circle of Schumann's friends and admirers—and very small it was at that time—accepted the newly proclaimed genius.

During Schumann's lifetime Brahms remained in Düsseldorf, devoting himself with all the earnestness of his serious nature to the study of the works of the great masters, especially Bach. But he also composed diligently, although for some years nothing new of the much-heralded new prophet appeared in print. In 1857 Brahms accepted an offer from the Prince of Lippe-Detmold. As director of an excellent chorus he

there gained that practical and intimate knowledge of choral singing which later on he utilized in the writing of his monumental masterpieces. He also completed his first concerto for piano and orchestra in D minor, op. 15. The first performance took place in Hanover, Jan. 22, 1859, with the composer at the piano and Joachim directing the orchestra. It was received with icy coldness. Five days later Brahms played it in the Gewandhaus in Leipzig. On that occasion the composer and his work were hissed. Undaunted by this failure, the master, together with Joachim and Stockhausen, appeared in the same year in his native city, where the same concerto and his first serenade for orchestra in D, op. 11, were received with enthusiasm. In the following year, 1860, he visited Hamburg again and produced two new works, the second serenade in A, op. 16, and those exquisite choruses for female voices with accompaniment of horns and harp, op. 17. The favorable reception accorded also to these works induced Brahms to resign his position in Detmold. For the next two years he again lived in Hamburg, although he spent much of that time making tours in Switzerland and along the Rhine.

In September, 1862, Brahms paid his first visit to Vienna. His success as pianist and composer was instantaneous, so that the conductorship of the famous Singakademie was offered to him, a post which he accepted. But before his three-year contract expired, he resigned and resumed his free, roaming life. The years from 1864 to 1868 he spent traveling about, indulging his favorite pastime of making extended foot tours, and stopping for longer or shorter periods at Baden-Baden, Winterthur, Karlsruhe, Zürich, and Bonn. In Zürich he met the celebrated surgeon Billroth (q.v.), a passionate lover of music, who became one of Brahms's most intimate friends and subsequently played an important part in his life. But while he thus indulged his passionate love for nature and travel, the master was not idle. It was during these years that he wrote, besides many other masterpieces, the work which first gained him general recognition, *Ein Deutsches Requiem*, op. 45, the score of which was completed in 1866. Three movements were performed in Vienna in 1867, but the first performance of the entire work took place under the direction of the composer in the cathedral at Bremen, April 10, 1868. The impression produced was so overwhelming that the work was not only repeated in Bremen 10 days later, but it made the rounds of the principal German cities. What Hanslick (q.v.) wrote at that time is still true today. "Since Bach's Mass in B minor and Beethoven's Missa Solennis nothing has been written in this field that can be placed by the side of Brahms's German Requiem."

Long before this the Wagner partisans had assumed an attitude of open hostility. Now all the enemies of Wagner flocked to the standard of Brahms. Personally, the master not only never sympathized with, but emphatically discouraged all attempts to set him up as an "anti-pope." He was, however, a close student of Wagner's scores and an ardent admirer of his genius. Brahms was one of the most profound musical scholars of his time. He knew everything that had been written before him, and he knew from personal study the works of all his important contemporaries. Besides this, he was a profound student of literature and history. When this is taken into account, together with the severely

critical attitude which he took toward his own compositions, it explains the comparatively small number of works produced during an active life extending over 64 years. At the same time it explains the uniform excellence of these works.

In the meantime Vienna had come to regard Brahms as her own. The influential critic, Dr Hanslick (qv), had been indefatigable in making propaganda for the master, and a small but truly appreciative circle of admirers brought it about that in 1872 the conductorship of the *Gesellschaft der Musikfreunde* (qv) was offered to Brahms. Rather reluctantly—for he knew he was not a great conductor—he accepted, and directed the concerts for three seasons. It was the last time that the master held an official position. After that Brahms devoted all his time to composition and his favorite studies. The revenues he derived from the sale and performance of his works were such that he could gratify all his simple tastes and lay aside a considerable fortune. In 1867 Billroth had settled in Vienna, and here his hospitable house soon became the centre of a select musical and artistic circle, whose special privilege it was to hear the first performance of all new works of Brahms before they appeared in print. The orchestral works were performed on two pianos, Brahms playing the first and Brüll (qv) the second. The summer months the master always spent in the country or traveling, the winter months in Vienna. For a quarter of a century this was the regular order of things. Henceforth the history of Brahms is the history of his works.

After the year 1877, when the master's first symphony appeared, all serious opposition was swept away. Only the extreme Wagner partisans continued their attacks. Bulow (qv), one of the most ardent, but sane, advocates of Wagner, now came forward as the equally zealous champion of Brahms. It was after the study of this symphony that Bulow originated his famous phrase of the "three great B's" (Bach, Beethoven, Brahms). On his triumphal tours with his celebrated Meiningen Orchestra he conducted all the great orchestral works of Brahms, and as a pianist played the two piano concertos in D minor and B flat. In this connection it is interesting to note that three other great conductors who worked indefatigably for the recognition of Brahms—Levi, Richter, Wüllner—were at the same time fighting the battle for Wagner. Every year Brahms gave the world at least one immortal masterpiece. Honor after honor was showered upon him. King Ludwig of Bavaria decorated him in 1874 with the Order of Maximilian, on the same occasion on which he conferred this distinction upon Wagner. The Berlin Academy of Arts elected him a member. The Universities of Cambridge and Breslau conferred upon him academic degrees, *honoris causa*, in 1877 and 1881 respectively. This honor on the part of the German institution Brahms acknowledged by the dedication of his *Akademische Festouvertüre*, op. 80. In 1889 the Senate of his native city elected him "honorary citizen," for which distinction the master sent the burgomaster the *Fest und Gedenksprüche* for eight-part chorus a cappella, op. 109. In the same year he was decorated with the Austrian Order of Leopold, and in 1896 with the medal for Arts and Sciences. On the occasion of his sixtieth birthday the *Gesellschaft der Musikfreunde* struck a gold medal in his honor.

Brahms's health had always been robust. During his whole life he had never known a

day's sickness. During the summer of 1896 some friends who visited the master at his summer home in Ischl were shocked at his appearance. His figure seemed to have shrunk, his skin was yellow, his expressive eyes had lost their lustre. The doctors correctly diagnosed the case as degeneration of the liver, but kept the seriousness of the disease from their patient. A treatment at Karlsbad brought only temporary relief. When, in the fall of 1896, Brahms returned to Vienna, he was much weakened. Nevertheless he would not hear of being sick and forced himself to appear among his friends and at concerts. On March 7, 1897, he was seen for the last time at a concert. His own Fourth Symphony was the principal number, and the revered master was forced to respond to the insistent calls from the audience. On the 24th he went out for the last time to dine with friends. After that his weakness increased so much that he was obliged to keep his bed. His devoted landlady and a few intimate friends remained in constant attendance until at 9:30 in the morning, on April 3, 1897, the great master closed his eyes forever. In the Central Cemetery of Vienna, opposite the grave of Beethoven and close by the side of Schubert, the mortal remains of Brahms were consigned to their last resting place.

In 1906 the Deutsche Brahmsgesellschaft was founded in Berlin, the object of which is the publication of books relating to Brahms. So far it has published the master's correspondence and the comprehensive biography by Max Kalbeck.

A Instrumental Works for Orchestra
First of all stand those four colossal symphonies, which can be compared only with the four greatest symphonies of Beethoven. The first in C minor, op. 68, was not given to the world until the year 1877, after the master had passed his fortieth year and was recognized as unsurpassed in all the fields he had cultivated up to that time. He knew what was expected of him as a symphonist, and, above all, he knew what he exacted of his own genius before taking the final step that was to place him on the highest pinnacle of his art by the side of Beethoven. Accordingly, as an experiment and by way of preparation, he wrote in 1873 those masterly variations on a theme of Haydn, op. 56. As Brahms had foreseen, friends and enemies immediately compared his first symphony with Beethoven's ninth—the latter to demonstrate Wagner's assertion that Beethoven had exhausted the form of the symphony, the former to demonstrate the contrary. But the overpowering grandeur of the themes, their masterly development, the noble intensity and majestic symmetry of the whole work assured the immediate triumph of Brahms. Bulow characterized it as the "Tenth Symphony." Following his usual custom of always entering upon a new field with two compositions in close succession, Brahms produced his Second Symphony in D, op. 73, in the following year, 1878. The success of this work even eclipsed that of the first symphony. The chief reason for this more enthusiastic reception is to be found in the fundamental mood of the two compositions. The first is severe, almost tragic, though it ends with a hymn of triumphant victory, the second is reposeful and breathes a spirit of unalloyed joy. The first discloses its beauties only after study or repeated hearing, the second makes an immediate appeal. Six years later, in 1884, the Third Symphony in F, op. 90, followed. Here the master again strikes more passionate ac-

cents. The irresistible sweep of the very beginning immediately carries the listener away and holds him spellbound. The Fourth Symphony in E minor, op. 98, appeared in 1886. In spite of the simplicity of its structural lines and the perspicuous grouping of its themes it is the one most difficult to penetrate. It fails to make an immediate appeal because of its austere character and the profusion of detail. Especially the finale appeals to the layman a hopeless puzzle. But it is nothing else than one of the older forms cultivated by Bach, the chaconne (q.v.), which no one expects to encounter in a symphonic movement. Brahms uses an eight-bar theme, which throughout the movement he holds as a basso ostinato (q.v.) over which the other instruments execute a series of variations.

The two beautiful serenades for orchestra appeared in 1860. The first, in D, op. 11, consisting of seven movements, is scored for full orchestra; the second, in A, op. 16, has only five movements and is scored for small orchestra. The form is one extensively cultivated by Haydn and Mozart. See SERENADE.

The *Academische Festouvertüre*, op. 80 (1881), is a work in strict form, built entirely upon well-known student songs for its thematic material. A marvel of contrapuntal skill, it nevertheless is full of rollicking jollity and exquisite humor. The *Tragische Ouvertüre*, op. 81, belongs to the same year. It delineates no definite programme, but portrays in masterly fashion the tragic mood.

For solo instruments with orchestra Brahms wrote two concertos for piano and orchestra in D minor, op. 15 (1859) and in B♭, op. 83 (1882). In reality both are symphonies with piano obligato. The solo instrument never predominates; it is intentionally treated as an integral and essential factor. Yet the demands made upon the mere technical equipment of the performer are enormous, while the musical content is beyond the interpretative powers of any but the greatest artists. The same is true of the concerto for violin and orchestra, in D, op. 77 (1879), which by many is regarded as the greatest violin concerto in existence. The double concerto for violin and violoncello and orchestra, op. 102 (1888), is one of the most difficult to appreciate of all the master's works. It is really a *concerto grosso* (q.v.) on a gigantic scale.

B. Chamber Music. Had Brahms written nothing but his imperishable masterpieces in the field of chamber music, he would still be immortal. Here he also surpasses all other masters, except Beethoven, and even the latter when we consider the variety of the combination of instruments. It was reserved for Brahms to show the possibilities of the horn and clarinet in combination with the instruments which ordinarily are regarded as best suited for chamber music. To speak of any of these works in detail would exceed the limits of this article. A mere enumeration must suffice. Three string quartets in C m. and A m., op. 51; B, op. 67. Two string quintets, F, op. 88; G, op. 111. Two string sextets, B♭, op. 18; G, op. 36. Quintet for pf, 2 vls, vla, vc, F m., op. 34. Three quartets for pf, vl, vla, vc, G m., op. 25; A, op. 26; C m., op. 60. Three trios for pf, vl, vc, E, op. 8; C, op. 87; C m., op. 101. Trio for pf, vl, horn, Eb, op. 40. Trio for pf, clar, vc, A m., op. 114. Quintet for clar, 2 vls, vla, vc, D m., op. 115. Three sonatas for pf and vl, G, op. 78; A, op. 100; D m., op. 108. Two sonatas for pf and vc,

E m., op. 38; F, op. 99. Two sonatas for pf. and clar, F m., and Eb, op. 120.

C. Piano Works. For piano solo Brahms wrote three sonatas in C, op. 1; F♯ m., op. 2; F m., op. 5. Schumann called them "symphonies in disguise." These, together with the great Scherzo in Eb m., op. 4, constitute the works of the composer's storm-and-stress period. In spite of their strong individuality and extraordinary beauty we feel the youthful exuberance of a Titan has done some violence to the symmetry of the form and in its almost overwhelming power forced the instrument beyond its natural limits. Brahms himself seems to have felt this, for, with the exception of the Ballads, op. 10, he wrote for the piano for many years nothing but variations—a form admirably suited to the cultivation of artistic restraint. These sets of variations consist of 16 var. on a theme of Schumann, op. 9, 11 var. on an original theme, op. 21, No. 1; 13 var. on a Hungarian song, op. 21, No. 2; 25 var. and fugue on a theme of Handel, op. 24; 28 var. on a theme of Paganini, op. 35. From 1860 to 1879 not a single composition for piano appeared. When at last the master wrote again for this instrument, he limited himself to small forms, which he filled with exquisite poetic content. These works comprise the opus numbers 76, 116, 117, 118, 119. Only in op. 79, containing those two magnificent Rhapsodies in C minor and G minor, does he attempt a larger form. For piano four hands Brahms wrote 10 variations on a theme by Schumann, op. 23, and a set of 16 charming waltzes, op. 39. The popular Hungarian Dances, arranged from themes of national composers, appeared without opus numbers.

As a composer for the piano Brahms must yield the palm to Chopin, and perhaps also to Schumann. It is, however, the only field in which he has been surpassed by any one.

D. Organ Works. For this instrument the master has written a Fugue in A♭ minor, a *Choralvorspiel* and *Päuge*, and a set of 11 *Choralvorspiele*, his very last work, all without opus numbers. Only in two other works does the organ figure as the accompanying instrument, the 13th Psalm for female voices, op. 27, and *Geistliches Lied* for mixed chorus, op. 30.

E. Vocal Works. (a) *With Orchestra.*—The greatest of these, the German Requiem, op. 45, has been mentioned. *Ave Maria*, op. 12, for female voices, was published in 1861. In 1869 appeared the cantata *Rinaldo*, op. 50, in which certain themes are employed as typical phrases after Wagner's manner in the *Flying Dutchman*. The following year brought forth a Rhapsody based on Goethe's *Harzreise im Winter*, op. 53, a work of lofty simplicity. In the *Schicksalslied*, op. 54 (1871), the composer contrasts, in accents of overwhelming grandeur, inexorable, pitiless fate and suffering, helpless humanity. Brahms's patriotism and interest in the political events of the time found a fitting expression in the *Triumphlied*, op. 55 (1872), dedicated to Emperor William I in commemoration of the victory won by the German arms. In 1881 the death of Anselm Feuerbach (q.v.) inspired the composition of *Némie*, op. 82, one of the noblest dirges in all music. The last of these great choral works, *Gesang der Parzen*, op. 89 (1883), is a work of almost depressing gloom and awful solemnity.

(b) *With Accompaniment of Other Instru-*

ments—*Begrabnisgesang*, op 13 (1861), with wood and brass instruments, female choruses, op 17 (1862), with two horns and harp, two songs for contralto, with piano and viola, op 91

(c) *A cappella*—For mixed chorus *Marienlieder*, op 22, 2 *Motetten*, op 29, 3 *Gesänge*, op 42, 7 *Lieder*, op 62, 2 *Motetten*, op 74, 5 *Gesänge*, op 104, *Fest und Gedenksprüche*, op 109, 3 *Motetten*, op 110 For female chorus 3 *geistliche Chöre*, op 27, 12 *Lieder und Romanzen*, op 44, 13 *Kanons*, op 113 For male chorus 5 *Lieder*, op 41

(d) *Songs*—Throughout his career Brahms cultivated the song, and it is perhaps as a song writer that the master is best understood and loved by the general public. In spontaneity of melodic invention, delineation of mood, and range of emotional expression he rivals Schubert, while in the matter of correct declamation and expressive elaboration of the piano accompaniment he surpasses the older master. The total number of Brahms's songs is 194, published in 31 opus numbers. Besides these original songs he arranged 14 *Volks Kinderlieder* and 7 books of genuine folk songs. On the same high level as the songs for one voice are the vocal duets and quartets. Among these latter the *Liebeslieder*, op 52, and *Neue Liebeslieder*, op 65, are especially remarkable for their striking originality of form. In reality they are instrumental waltzes for four hands with vocal quartet *ad libitum*, both parts being written with such independence that either can be performed without the other.

Brahms's position in the history of music may even now be regarded as definitely settled. With his great choral works he stands by the side of Bach, as an instrumental composer he ranks with Beethoven. His style is the ideal combination of the order polyphonic and the later homophonic art. All his works are stamped with the characteristics of a distinct, powerful individuality. Severity and sublimity are the predominant traits of his music, but the gentler emotions and genuine humor are by no means lacking. More than any other of the great masters Brahms has sought inspiration at the inexhaustible fount of folk music, and no one ever equaled him in the skill with which he molded this simple material into imperishable works of art. His melodic line is always broad and noble, his harmony, however bold, saturated with euphony, his rhythm incisive and infinitely varied. Hand in hand with these qualities goes a sovereign mastery of technique. Brahms not only has shown that the possibilities of the instrumental forms had not been exhausted by Beethoven, but he has conclusively proved that those forms are practically inexhaustible in the hands of a supreme master. With Brahms, as with Beethoven, the form is eminently plastic, it always adapts itself to the content. Brahms, just as Beethoven had done before him, has re-adjusted or extended details with utmost freedom, according to the exigencies of the thematic material. The occasional introduction of a third subject in extended movements, the employment of contrasting slow and fast tempi within the same movement, the introduction into a symphonic movement of contrapuntal complexities formerly considered practicable and permissible only in the fugue, affect only the detail of arrangement and disposition within the form, they do not touch the fundamental laws under-

lying the architectonic structure. Such infinite variety and elasticity prove the inherent vitality of the form.

Just as Beethoven had begun at the point where Haydn and Mozart had left off, so Brahms began by continuing the achievements of Beethoven's third period. But as these mark the highest conceivable development of absolute music Brahms could not rise higher. As a matter of fact no development is traceable in the master's works after the extremely brief period of storm and stress is passed. What constitutes the peculiar greatness of Brahms is his own powerful individuality, the deep earnestness and absolute sincerity of his music, the scrupulous avoidance of everything that is commonplace.

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BRAHUI, bra-hū'ē. The aboriginal population who preceded the Baluchis in Baluchistan, and are now the dominant people, chiefly in the region centring in Kelat, from Quetta on the north to Las Bela on the south. Both physically and linguistically they are said to be related to the Dravidian tribes of India. It is held by some that many of the so-called Brahui adopted that language in quite modern times, having given up their original tongue, said to have been Kurd-gal. The Brahui profess the Sunnite creed of Islam with native additions and modifications. Physically they are well built, thickset, short in stature as compared with the tall Baluchis, and have round faces, with brown hair and beards. Some of these traits may be due to their mountain environment. Consult Trumpp, "Grammatische Untersuchungen über die Sprache der Brahuis," in *Sitzungsberichte der königlichen bayerischen Akademie der Wissenschaften, Philosophisch-philologische Klasse* (1880), Bellew, *Indus to Euphrates* (London, 1874), Hughes-Buller, *Report on the Census of Baluchistan* (1902), Biggswitter, *Guide to the Study of Brahui* (Allahabad, 1909).

BRAID, JAMES (c1795-1860). An English physician and writer on hypnotism, born in Fife, Scotland. He studied medicine in Edinburgh and settled as a surgeon in Manchester. He is especially noted for his researches on the subject of animal magnetism, for which he originally used the term *neurohypnotism*, later shortened into the term *hypnotism*. He read a paper at the meeting of the British Association in Man-

chester on June 29, 1842, entitled *Practical Essay on the Curative Agency of Neurohypnotism*, and in 1843 he published his work *Neurohypnotology, or The Rationale of Nervous Sleep Considered in Relation to Animal Magnetism*. See HYPNOTISM.

BRAIDISM. See HYPNOTISM.

BRAIDWOOD, THOMAS (1715-1806). An early and successful Scottish teacher of deaf-mutes. After graduating from Edinburgh University, he became a school teacher. He was for a short time assistant in the grammar school at Hamilton, and later opened a private school in Edinburgh. This was the first school for deaf-mutes in the British Empire. In 1760 a boy born deaf was placed with him to be taught writing. Braidwood taught him to speak and accepted other deaf students. In 1783 the school was given a royal grant of £100 a year and moved to Hackney, near London. His method was not allowed to be known outside his own family for many years, consequently his family enjoyed a monopoly, teaching it after his death. He used the Hemicke system principally, "reading from the lip," giving prominence to attempts at articulation. A little work, called *Vox Oculis Subjecta*, published by an American, Green, whose son was educated there, gives a good idea of the school in Edinburgh.

BRAIL (OF. *braiel*, a breech girdle, cincture, from Lat. *bracc*, breeches). A rope fitted to a fore-and-aft sail for the purpose of hauling it in to the mast when taking it in (the reverse of setting or spreading it). Brails are usually fitted in pairs and lead from the after boltrope of the sail to small blocks or dead-eyes on the mast and thence down to the deck. To "brail up" is to haul the sail close in to the mast ready for furling.

BRAÎLA, bră-î-lă, BRAILOV, bră-î-lôf, or IBRAIL, îb-ră-êl'. A town of Rumania, in Wallachia, situated on the left bank of the Danube, about 102 miles northeast of Bucharest (Map: Turkey in Europe, G 2). It is a place of great commercial importance, being the centre of the grain export trade of Wallachia. Among its industries are cement, corn and flour, and rolling mills; also manufactories of soap, candles, rope, and twine. In the vicinity are mud baths and sulphur springs, the strongest of their kind, and among the best known in Europe. After 1774 it was converted into a strong fortress by the Turks, but was unable to withstand the Russians in 1828. It has ceased to be a fortress, Galatz having supplanted it. Pop., 1905, 58,965; 1909, 60,259; including a number of Greeks and Bulgarians.

BRAILLE, bră-y', LOUIS (1809-52). A French teacher of the blind, who himself was blind from his third year. He was born at Coupvray and in 1810 went as a founding to the Institute for the Blind in Paris. There he became a teacher in 1828 and in 1829 devised his point system of writing for the blind. See BLIND, EDUCATION OF THE.

BRAIN. See NERVOUS SYSTEM.

BRAIN, DISEASES OF THE. These consist of disturbances of the circulation; inflammations following infections, injury, etc.; hemorrhages, degeneration, sclerosis, softening, malformations, and disorders called functional because no anatomical lesion is found after death that is regarded as due to the disorder or causative of it. A few of the common diseases of the brain will be considered. *Anæmia* and *hyperæmia* of

the brain are conditions, rather than diseases, and are considered here for convenience' sake. In the latter there is an excessive amount of blood in the cranial cavity, in the former there is too small an amount of blood in the vessels of the brain. *Anæmia* may be due to arterial disease, kidney disease, syphilis, wasting diseases, hemorrhages, faulty digestion, or fright. Its symptoms are faintness, vertigo, confusion of mind, and nausea. *Hyperæmia* is caused by the use of alcoholic beverages, by injury, sunstroke, prolonged mental overwork or worry, or by obstruction to the return of blood from the brain. The symptoms are headache, vertigo, insomnia, ringing in the ears, confusion of ideas or inability for mental application. Abscess of the brain is an acute suppurative inflammation of a limited area of the brain substance, with a production of pus. It is caused by infection by pus germs from middle ear or mastoid disease, or from the nasal cavities, by injuries, tumors, or by infectious diseases, such as diphtheria, typhoid fever, smallpox, *la grippe*, etc. Paralysis generally occurs, with headache, vomiting, and delirium. Trephining is the only treatment. "Softening of the brain" is the common (erroneous) term for any form of mental disease in which there is failure of mental power; and especially for general paresis, in which in reality a hardening occurs. True softening follows embolism (q.v.) or thrombosis (q.v.), in which the blood supply is cut off from a part of the brain, which generally becomes red or yellow, dies and softens, and may be absorbed or may go on to the production of abscess. Softening causes marked mental changes resembling those of dementia and sometimes paralysis. Brain palsies of children are either paralysis of one side of the body, or of both sides of the body, or of both lower extremities. The lesions are in the upper motor segments of the hemispheres of the brain and are due to injuries or disease of the mother during pregnancy or injury of the child during birth. Wasting of the paralyzed limbs occurs as the children grow, with the production of contracted muscles, clenched hands, or club feet. *Brain fever* is a popular and erroneous term, which is generally applied to meningitis, though used for other affections and conditions. *Inflammation of the brain* is also an erroneous term, signifying usually meningitis or abscess of the brain. Encephalitis without meningitis or abscess is a rare condition, but according to Gowers and other authorities may occur, although difficult of diagnosis. *Tumors* may be either tubercle, syphiloma, glioma, or sarcoma, or other less common forms, as all varieties of new growths may be found in the brain. They are all rare. They generally cause intense and constant headache, vomiting, with or without nausea, vertigo, changes in sensation, convulsive movements of upper or lower extremity or of the face without loss of consciousness, deterioration of sight and some mental defect. Treatment depends upon the variety of tumor and its location. Tubercular or syphilitic tumors are the most favorable, as regards possibility for treatment. See APOPLEXY; APHASIA; CONCUSSION OF THE BRAIN; EMBOLISM; THROMBOSIS; EPILEPSY; PARALYSIS; SCLEROSIS; STYPHILIS.

BRAINARD, DAVID LEOGE (1856-). An American explorer, born in Norway, Herkimer Co., N. Y., and educated in the common schools and the State Normal School at Cortland. He

enlisted as a private in the United States army in 1876 and served in Indian campaigns under Gen Nelson A Miles. In 1881 he was first sergeant of the Lady Franklin Bay expedition under Lieut (now Gen) A W Geely, and was a member of the party of three who (on May 15, 1882) reached lat 83° 24' 30". This remained the highest latitude reached by explorers for 13 years, and the most northern known point of land for 18 years. Upon his return he became a sergeant in the Signal Service and afterward was commissioned a second lieutenant in the Second United States Cavalry. He served in the Alaskan government relief expedition in 1897, was made a colonel in the subsistence department of the United States in 1898, and went to the Philippines in 1900 as major, in that department, in the regular army. In 1905 he became lieutenant colonel and deputy commissary general of the United States army. Consult Humphreys, *Missionary Beploires among the American Indians* (New York, 1913).

BRAINARD, JOHN GARDINER CALKINS (1796-1828). An American poet and editor, born in New London, Conn., Oct. 21, 1796. He was graduated at Yale in 1815, studied law, practiced at Middletown, Conn., but in 1822 went to Hartford to edit the *Connecticut Mirror*, which he brought into general notice by his literary contributions, especially ballads. After five years failing health obliged him to give up his editorship, and after brief retirement in Long Island he returned to New London to die, continuing poetic composition to the last. He had collected his poems in 1825. A full edition, *Literary Remains*, with a biographical sketch, was made by John G. Whittier, his successor as editor of the *Mirror*, in 1832. It passed through three editions in 10 years, but his facile verse is now almost forgotten. Brainard died in New London, Sept. 26, 1828.

BRAINE-LE-COMTE, brân'le-kôm'té (anciently, Lat *Brenna Comitis*). A town in the province of Hainaut, Belgium, 19 miles southwest of Brussels (Map Belgium, C 4). It formerly belonged to the monks of St Waudru at Mons, from whom it was bought by Count Baldwin in 1158. It has an old church of the thirteenth century, cotton and corn mills, dye works, breweries, paper factories, and stone quarries. A very fine quality of flax is grown in the district. Pop., 1900, 8935, 1910, 9438.

BRAINERD, brân'erd. A city and the county seat of Crow Wing Co., Minn., 139 miles north by west of St Paul, on the east bank of the Mississippi River, and on the Northern Pacific and the Minnesota and International railroads (Map Minnesota, C 4). The Northern Pacific has here large machine, car, and other shops, and a hospital. The city also contains St Joseph's Hospital, a fine courthouse, Y M C A building, a Carnegie library, a public park, and athletic grounds. A dam across the Mississippi furnishes water power for various manufactures. There are extensive lumber yards, cigar factories, large foundry and machine shops, flour mills, paper and pulp mill, etc. The Cuyuna iron range extends northeast and southwest through Brainerd. The city is important as the commercial centre for the adjacent region, the export trade consisting largely of lumber, grain, hay, furs, and iron. Brainerd was chartered as a city in 1883. The water works and electric light plant are operated by the city. Pop., 1890, 5703, 1900, 7524, 1910, 8526.

BRAINERD, DAVID (1718-47). An American missionary born in Haddam, Conn. His missionary work was among the Indians in Massachusetts and those around the Delaware and Susquehanna rivers. He died at Northampton, Mass., at the house of Jonathan Edwards, who wrote his biography (Boston, 1749). As missionary classics (best ed J M Sherwood, New York, 1884), that and Dained's *Journals* are well known. His brother, JOHN BRAINERD (1720-51), continued his labors among the Indians.

BRAIN FEVER. See BRAIN, DISEASES OF.

BRAIN STONE. See CORAL.

BRAINTREE. A town, including the villages of South and East Braintree, in Norfolk Co., Mass., 10 miles south of Boston, on the New York, New Haven, and Hartford Railroad. It has granite quarries, metal foundries, and manufactures of boots, shoes, leather, tacks, naturalized rubber, rubber cement, conductors' punches, etc (Map Massachusetts, E 3). The town contains Thayer Academy and the Thayer Public Library. The government is administered by town meetings. The water works and electric light plant are owned by the municipality. First permanently settled in 1634, when the General Court of Massachusetts ordered that Boston, being "too small to contain many," "shall have convenient enlargement at Mount Wollaston." Braintree was incorporated as a town in 1640. In the portion of old Braintree now included within the limits of Quincy, Thomas Morton (qv) established his "New Canaan" at "Merry-mount" (Mount Wollaston), and John Adams, John Hancock, and John Quincy Adams were born. The township included Quincy (qv) until 1792 and Randolph until 1793. Pop., 1900, 5981, 1910, 8526. Consult Pattee, *History of Old Braintree and Quincy* (Quincy, 1878); Adams, *Three episodes of Massachusetts History* (Boston, 1892); Bates (ed.), *Records of the Town of Braintree from 1610 to 1793* (Randolph, Mass., 1886); Wilson, Quincy, *Old Braintree, and Merry-mount* (Boston, 1906).

BRAITH, brith, ANTON (1836-1905). A German animal painter. He was born in Biberach (Württemberg) and studied first with Johann Baptist Plüg in his native city and later in the Art School at Stuttgart. In 1860 he removed to Munich and came under the influence of Piloty. There he gained renown as an animal painter, although he never satisfactorily solved the problem of color. Among his works are "The Herd before a Storm" (1867, Gallery of Cologne), "Return of a Flock of Sheep from the Alps" (1880, Stuttgart), "A Bright Morning" (1886, Berlin National Gallery), "The Peasant Woman's Pet" (1891, Munich), and "Cows at the Brook" (1896, the museum of his native town, which also possesses the best collection of his drawings).

BRAIZE (probably akin to *bream*, OF *bresme*, cf OHG *brāhsima*, *brāhsa*, *brēam*), or BECKER. 1. A British sparoid marine food fish (*Sparus pagrus*), commonly called porgy, seup, or king of the breams (See BREAM). 2. In Scotland, the roach.

BRAKE (OE *brake*, LG *brake*, Ger *Brache*, a tool for breaking flax, from the same root as *break*). A mechanical contrivance consisting usually of a shoe or band applied to the surface of a rotating shaft or wheel in such a manner that motion is retarded by means of the friction. A shoe brake consists of a wood or metal block or shoe which is pressed against the rim of a wheel by means of a system of levers. The

BRAKE AND BIRCH



1. BRAKE (*Pteris aquilina*).

2. COMMON WHITE BIRCH (*Betula alba*), in early May
near New York City.

hand brakes used on railway cars and the foot or hand brake used on horse-drawn vehicles are familiar examples of shoe brakes. Band brakes consist of a flexible band looped around the perimeter of the wheel and contrived so that it may be tightened and thus grip the wheel. Such brakes are extensively used on hoisting engines and motor vehicles, and also on some makes of bicycles. The internal expanding shoe brake, where by means of a toggle linkage or cam a hinged shoe is forced against the interior of a drum by simple lever action, is found on many motor cars. Perhaps the most elaborate braking mechanism in common use is the air brake for railway cars. (See AIR BRAKE.) The Prony brake is a form of band brake used to measure the horse power of a rotating shaft or pulley, and is more properly classed as a dynamometer than as a brake.

BRAKE (AS. *bracce*, a fern). A popular name for the cosmopolitan ferns of the genus *Pteris*. This genus is a member of the family Polypodiaceæ and is distinguished by having the spore cases situated along the edges of the leaves and covered by the reflexed margin of the frond. The common brake or bracken (*Pteris aquilina*) is very abundant in most parts of the world, growing in heaths, parks, etc., often covering considerable tracts. It has a long, creeping, black rhizome, or rootstock, from which grow up naked stalks of 8 to 18 inches or more in height; each stalk divides at the top into three branches; the branches are bipinnate, the inferior pinnales pinnatifid. The rootstock, when cut across, exhibits an appearance which has been supposed to resemble a spread eagle, whence the specific name *aquilina* (Lat. *aquila*, an eagle). The rootstock is bitter and has been used as a substitute for hops; it has also been ground, mixed with barley, and made into a wretched bread in times of distress. The plant is astringent and antelmintic, and as such it had at one time a high reputation, although it is now little used, at least by medical practitioners. It is employed in dressing kid and chamois leather. Brake is also employed for thatching, for littering cattle, etc., and is occasionally chopped up with straw or hay for feeding cattle. It is a favorite cover of deer and other game. The abundance of this plant is sometimes regarded as a sign of poor land, although, probably, its absence from the richer soils is very much a result of cultivation. To extirpate it, nothing more is necessary than a few successive movings of the young shoots as they appear. The annual growth of brake is killed by first frosts of autumn, but remains rigid and brown, still affording shelter for game, and is almost as characteristic a feature in the landscape of winter as in that of summer, perhaps adding to its general desolateness. *Pteris caudata*, a large species of brake, very similar to that of Europe, is one of the worst pests which the farmer has to contend with in the south of Brazil. *Pteris esculenta*, a native of New Zealand, Van Diemen's Land, etc., has a rhizome more nutritious than that of the common brake. Two species, *Pteris orelica* and *P. serrulata*, are common household plants.

BRAKELONDE, bråk'lönd, JOCELIN DE. See JOCELIN DE BRAKELONDE.

BRAKSY. See BRAXY.

BRAMA (probably akin to *bream*; see BRAZYE). A genus of fishes of the family Chætodontidæ. *Brama raiti* is common in the Medi-

terranean and occasionally found on the British shores, where it is called sea bream and gilt-head. The genus has the body very deep and compressed, the head rather obtusely terminated, a single elongated dorsal fin, and the anal fin with a very lengthened base. The tail is forked, its points extremely divergent. This fish is sometimes more than two feet in length. Its flesh is of exquisite flavor. See SEA BREAM.

BRAMAH, brä'mä, JOSEPH (1748-1814). A practical machinist, born at Stanborough, Yorkshire, England. Unable to work on his father's farm on account of lameness, he was apprenticed to a carpenter and joiner and afterward obtained employment with a cabinetmaker in London, where subsequently he established himself in business and became distinguished for the number, value, and ingenuity of his mechanical inventions, such as safety locks and improvements in pumps and fire engines, in the construction of boilers for steam engines, in the processes of making paper, in the construction of main pipes, wheel carriages, printing machines, and the beer machine used at the bar of public houses. In 1795 he patented his most important contribution to mechanics, the hydraulic press known by his name.

BRAMAH'S PRESS. See HYDRAULIC PRESS.

BRAMANTE, brä-män'tä, DONATO D' AGNOLO, often called LAZZARI (1444-1514). One of the principal architects of the Italian Renaissance. He was probably born at Monte Asdrualdo, near Urbino; practiced painting under Piero della Francesca and Mantegna and executed works in Milan and Bergamo (1472-77), but soon devoted himself entirely to architecture. His career falls into two main divisions: (1) The 28 years of early work in Milan, 1472-99; and (2) the 15 years of work in Rome, 1499-1514. Each period is marked by a style so distinct that some have questioned whether their works were really by the same master. The most important of his Milanese works are the transept, apse, and sacristy of San Satiro (c.1480-88); his masterpiece in decoration and composition, the choir and dome of Santa Maria delle Grazie, with its perfect union of brickwork with details in terra cotta and marble; and parts of the Ospedale Maggiore. In the choir of Santa Maria delle Grazie he was the first to apply candelabrum shafts as an exterior decoration to pilasters, a device widely imitated in France and Spain after the battle of Pavia (1525). Outside of Milan are the simple but masterly composition of a façade at Abbiategrasso and the octagonal Canopanovo Church in Pavia. To him have been ascribed the cathedral of Pavia, the nave of Como Cathedral, the Inconronata at Lodi, the Consolazione at Todi, and many other works with which his connection is problematic or wholly fictitious; but these ascriptions prove the extent of his influence in Lombardy and its long duration after his departure from Milan and even after his death.

At the age of 55 Bramante went to Rome. Hitherto he had seen the antique through the interpretations of his Renaissance predecessors, from Brunelleschi (q.v.) to Fra Giocondo (q.v.), through such masters as Alberti (q.v.) and Laurana (q.v.). He now went for the first time to the fountain head. The transformation of his style which followed was due not only to the overpowering effect of the Roman monuments, but also to the necessities of the change in the materials with which he had to work. In Lom-

bardy brick predominated, and his Lombard style was formed by work in brick and terra cotta, in Rome he was to work in masonry of cut stone, at least in all his major works. Considering his age, the rapidity of his adjustment of style and conception to the new conditions is astonishing evidence of his genius. His new manner inaugurated the period of the Middle Renaissance, of which he became the leader. The patronage of the Popes gave him the opportunity Alexander VI and Julius II employed him on important buildings. Bramante brought to Rome his love of dome construction, and a thorough knowledge of perspective and of the engineering and constructive side of his art. To this equipment he joined a remarkable appreciation of the essential qualities of antique Roman architecture—its scale, its monumental stateliness, its breadth of design. He expressed himself almost immediately in an exquisite gem, the circular tempietto at San Pietro in Montorio, famous "as the first building after a lapse of 1200 years built entirely in the ancient spirit and style." Soon after came the cloister of Santa Maria della Pace, also a classic. Both buildings gave the tone for the pure, cold style of the sixteenth century. Bramante's part in the design of the grand Cancelleria Palace, and the smaller Gnaudi-Torlonia Palace, is a subject of much controversy. The first was begun before he came to Rome, the second after his arrival. There are elements in both which link them on the one hand to Lombard types, on the other to his work on the Vatican, and there is little doubt that he at least completed both. Many authorities, however, ascribe their original design to some unknown architect from the north.

Bramante was in 1503 intrusted with the planning of the greatest architectural labor of the Renaissance, the reconstruction of the Vatican Palace and of St. Peter's. His plans for St. Peter's, though only partly carried out, were known through drawings to all architects and exercised an enormous influence. They comprised a huge dome over the intersection of the arms of a Greek cross with apsidal terminations, and with towers, chapels, and loggias filling the four angles. He designed the two immense wings or galleries of the Vatican, to connect the older palace with a group nearly 1500 feet away to the north, but himself erected only the east gallery, with the northern block comprising the impressive *Nicchione*, or apse, and the Cortile di San Damaso at the southern end, this was later decorated by Raphael (see LOGGIE, RAPHAEL) and his pupils. His death in 1514 put both these undertakings into other hands. But during his last years he had developed his latest manner, as is shown in his own palace in Rome ("Raphael's house"), and in the Palazzo di San Diego, where the rustic work on the lower story and the engaged columns above, no longer existing, furnished a type that was used by Raphael, Sanmichele, Sansovino, Palladio, and other leading architects. Consult Von Geymuller, *Die ursprünglichen Entwürfe für die Peterskirche* (Vienna, 1875), Semper, in Dohme, *Kunst und Künstler* (Leipzig, 1879), and Vogel, *Bramante und Raphael* (Leipzig, 1910).

BRAMBACH, bram'bag, KASPAR JOSEPH (1833-1902). A German composer. He was born in Bonn and was a pupil of Ferdinand Hiller. He was first violinist of the opera orchestra in Bonn from 1847 to 1850, and musical director in that city from 1861 to 1869. His works in-

clude an opera, *Antadne*, and the well-known cantatas, *Das eleusische Fest* (op. 32), *Trost in Thänen* (op. 10), *Die Macht des Gesanges* (op. 6), *Columbus* (op. 58, 1886), *Frühlingssymnus* (op. 37), *Alceste* (op. 14), and *Prometheus* (op. 47), all of which enjoy considerable popularity and are frequently performed.

BRAMBLE (akin to Ger *Bram*, *Brame*, the broom tree). A name used in America as a collective term for all plants of the genus *Rubus*, including the raspberry, blackberry, and dewberry. In Great Britain it is used to distinguish the native blackberry (*Rubus fruticosus*), which bears an inferior fruit, from the raspberry and others of that type. The bramble is a common wild plant in Great Britain and most parts of Europe. Although it is abundant everywhere and bears fruit of fair quality, it has never attracted much attention from cultivators because of its weedy nature. In fact, it was considered a nuisance and was so referred to in literature as far back as Shakespeare's time. See BLACKBERRY, RUBUS.

BRAMBLING (from *bramble*, Ger *Bramling*), or MOUNTAIN FINCH. A large, brightly colored finch (*Fringilla montifringilla*), nearly allied to the chaffinch, which during migrations appears in large numbers throughout Europe and parts of Asia, to the northern borders of which it resorts to breed in the birch forests.

BRAMPTON. The capital of Peel Co., Ontario, Canada, and a busy junction of the Canadian Pacific and Grand Trunk railroads, 21 miles northwest of Toronto (Map Ontario, E 6). It manufactures flour, boots and shoes, office supplies, paper boxes, elevators, and bricks; has a considerable trade in cut flowers, cattle, and hogs, and is a market for grain and produce. Pop., 1901, 2748, 1911, 3412.

BRAMWELL, SIR FREDERICK (1818-1903). An English civil engineer, born in London. In 1856 he became an associate of the Institution of Civil Engineers and in 1884 its president. In 1888 he was elected president of the British Association. He was prominent in many important undertakings in connection with his profession and was also long active in endeavoring to promote the technical education of workmen.

BRAMWELL, JOHN MILNE (1852-) An English physician and author. He was born at Perth, N. B., and was educated at the University of Edinburgh. He devoted considerable study to hypnotism and combined the French methods of hypnosis respectively employed in Paris and Nancy with good results. He wrote *Successful Treatment of Dipomania, Insomnia, etc.*, and *Various Diseases by Hypnotic Suggestion* (1890-92), *Hypnotic Anaesthesia* (1896), *On the Appreciation of Time by Somnambulists* (1896), *Suggestion Its Place in Medicine and Scientific Research* (1897), *Hypnotism Its History, Practice, and Theory* (1903), *Hypnotism and Treatment by Suggestion* (1910).

BRAN (OF *brén*, *bran*, *brian*, Welsh, Ir *bran*, husk, chaff). The outer coat of wheat, rye, and other cereal grains, separated from the flour in milling by bolting. Wheat bran is often spoken of simply as bran, while rye bran, corn bran, rice bran, etc., are usually referred to under their full names. Wheat bran is extensively used and highly prized as a feeding stuff for nearly all kinds of farm animals. Fed with corn meal (maize), the combination is hardly surpassed for cows, the bran furnishing not

only the bulk, but the protein and ash which are necessary to milk production. The other kinds of bran are much less abundant in quantity, but are utilized quite generally for feeding purposes. The average percentage composition of different kinds of bran, from a large number of American analyses, is shown by the following table:

KIND OF BRAN	Protein	Nitrogen-free extract	Fat	Fibre	Ash	Water
Bran from spring and winter wheat.....	15.4	53.9	4.0	9.0	5.8	11.9
Rye bran	14.6	54.0	3.8	3.4	3.4	11.8
Rice bran	12.6	50.0	9.5	8.9	0.4	9.3
Corn bran	19.0	63.1	3.8	11.7	1.4	9.4
Buckwheat bran	12.6	37.9	3.5	32.9	4.9	9.2

Middlings, or shorts, contain some of the finer bran and coarse flour, although they are of the same origin as bran, viz., from the outer coat of the grain. They contain less fibre and ash—mineral matter—than bran and are considered better suited to pigs and horses.

The black woody hulls of the buckwheat grain have little feeding value; but the portion lying immediately under the hulls, which forms the middlings, is rich in protein and fat and has a high feeding value. The hulls and middlings are often mixed and sold as buckwheat bran, in which case the proportion in which they are mixed determines the value of the bran.

Wheat bran contains in 1000 pounds about 265 pounds of nitrogen, 290 pounds of phosphoric acid, and 160 pounds of potash. The same amount of rye bran contains 230 pounds of nitrogen, 230 pounds of phosphoric acid, and 140 pounds of potash. Hence, in feeding these materials, the fertility of the farm is being added to if the manure is properly cared for and used. Bran is used in dyeing and in calico printing.

BRAN. The dog of Fingal. There was a Scottish tradition, before Macpherson's *Ossian* appeared, that a southern chief challenged Fingal to hunt Bran in Sledale against his own dog, Phorp, of the same breed, the present Scottish deerhound. The dogs ran equally well all day; so, as a further test, their owners set them fighting. Bran was getting the worst of it, when the chief said something about Bran which angered Fingal, who seized Phorp, and with his charmed hand tore his heart out. But Bran suffered so in the fight that he died in Glen Loch and was buried there.

BRAN, THE BLESSED. The name of the hero of the poem *Myssyrian*, by Tälisen. He was the knight who found a vessel of decoration and mystic connections similar to those of the Holy Grail.

BRANCA, brän'ká, ASCANTIO (1840-1903). An Italian statesman. He studied law at the University of Naples, became known as a journalist and economist, and in 1870 was elected to the Chamber of Deputies, where in 1885 he joined the party of the opposition. In 1891-92 he was Minister of Public Works, in 1896-98 of Finance, and again in 1900-01 of Public Works. He published *Lo crédit et la banque internationale* in 1871.

BRANCH. See BRANCHING.

BRANCH, JOHN (1782-1863). An American politician. He was born in North Carolina, and graduated at the State University in 1801. He was State Senator from 1811 to 1817, Governor of North Carolina from 1817 to 1820, and from 1823 to 1829 served in the United States Senate. He then was Secretary of the Navy under President Jackson from 1829 to 1831, a Democratic member of Congress from 1831 to 1833, and Governor of the Territory of Florida from 1844 to 1845.

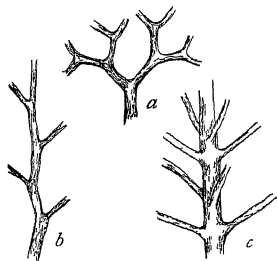
BRANCHIA. See GILL.

BRANCHIATA, brän'ki-ä'tä (Neo-Lat. neut. pl. of *branchiatus*, having gills, from Lat. *branchia*, Gk. βράγχια, *branchia*, gills). One of the two great branches or subtypes into which the Arthropoda (q.v.) are divided, the other being the Tracheata. They are characterized by the presence of gills in some form, though it may be only as thin portions of the body integument. They have no tracheæ or tracheal tubes of any sort and breathe air only as it is present in water. Many of the very small forms, and some of the larger ones, apparently have no distinct gills, but receive the oxygen which they need through a part or all of the body surface. In accordance with their manner of breathing, the Branchiata live in water either fresh or salt, and the exceptions to this rule are to be found only among the higher groups, where certain species have special structural features that enable them to live a greater or less time on land, usually, however, in damp places. The classification of the Branchiata is perplexing; for while the one class Crustacea (q.v.) is well defined, there are a few other living, and many fossil forms like the king crabs and trilobites, which present the greatest difficulties.

BRANCHIDÆ, brän'ki-dë (Gk. βράχιδαί, *Branchidai*, also called *Didymoi*, Διδύμοι, *Didymoi*, or *Didyma*, Διδύμα). A place on the seacoast of Ionia, a little south of Miletus and near Panormus, celebrated for its temple and oracle of Apollo Didymeus. The hereditary ministers of this oracle, which was one of the most famous of the Greek world, were the Milesian Branchidæ, who traced their descent from Branchus, a favorite of Apollo. When the oracle was instituted is not known, but its first period of great celebrity was in the sixth century B.C. The temple and the oracle were destroyed, either (according to Herodotus) by Darius at the time of the destruction of Miletus, 494 B.C., or (according to Strabo, Plutarch, and Pausanias) by Xerxes some years later. Xerxes exiled the Branchidæ to the far northeastern part of the Persian domain. The temple was rebuilt, after 332 B.C., but on so grand a scale that it was never fully completed and always remained without a roof; its ruins contain some beautiful specimens of the Ionic order of architecture. The ruins were explored in 1764 by Sir Richard Chandler, and in 1812 by Sir William Gell. Charles Thomas Newton (q.v.) also visited the site. The French examined the ruins in 1873 and sent some sculptural fragments to the Louvre; they made a more detailed search in 1895, through M. E. Pontremoli and M. B. Hausoulle. Later, the French surrendered their rights in the site to Th. Wiegand, a German archaeologist, explorer of Miletus. In 1905 he began to clear the great temple completely. Consult: Gelzer, *De Branchididis* (Leipzig, 1869); O. Rayet, *L'architecture ionique en Ionie; Le temple d'Apollon Didyméen* (Paris, 1876); C. T.

Newton, *History of Discoveries at Halicarnassus, Cnidus, and Branchidae* (London, 1862-63), E. Pontieri and B. Haussoullier, *Didymes* (1904)

BRANCHING (Fr *branche*, branch, It, Sp *branca*, branch, claw, from LL *branca*, claw, possibly from Lat *bra*[*cl*]eum, aim, claw.) There are two general types of branching, known as the "dichotomous" and the "monopodial." In the former the apex of the axis forks, the old axis ending at the point of branching. In some cases three branches may arise in this way, resulting in "trichotomy," or even more than three branches may arise by the division of a growing tip, but the term "dichotomy" is a general one, covering all cases of branches arising in this way, without reference to the number. Thallus bodies are particularly inclined to dichotomous branching, and hence its chief display is among the algae and fungi, the liverworts, and the prothallia of ferns. Among seed plants there are cases which resemble dichotomy, as in the branching of the lilac, but this is "false dichotomy," because, although two branches seem to arise from the apex of an axis in forking fashion, they are really lateral branches, the apex of the old axis remaining between them undivided but arrested in growth.



BRANCHING a, dichotomous, b, monopodial, c, sympodial

In monopodial branching the branches arise laterally from the axis. This type is characteristic of the seed plants, but it is found in the lower groups as well. In this case the tip of the main axis may continue to grow vigorously, and a central shaft may develop, as in the pines and firs, such a habit is called "excurrent," the main shaft "running through" the whole branch system. In other cases, as in the elm, some of the lateral branches are more vigorous than the main axis, which is presently lost sight of, and the trunk seems to be replaced above by a set of large divergent limbs, a habit called "deliquescent," meaning that the main axis is "dissolved" into branches. Sometimes what appears to be the main axis is really a series of strong lateral branches which simulate it. A strong lateral branch appears just behind the tip of the axis, pushes it aside in its growth, and continues the direction of the main axis, then a lateral branch from this first branch does the same thing, and so on until the principal axis consists of a series of strong lateral branches, as in the linden. Such an axis is called a "sympodium," and this sympodial development is apt to be characteristic of groups of plants.

The branching of roots is never so symmetrical as that of stems, the branches arising from any point, while those of the stems are related very definitely to the nodes, at which the leaves appear. Another characteristic of root branching is that the branches arise from the central woody cylinder and burrow their way through the cortex, while in stems the branches arise superficially, of course involving also the deeper tissues. The root type of branch origin is said to be "exogenous" ("inside origin"), and the stem type is "exogenous" ("outside origin"). This is the proper application of the terms "endogenous" and "exogenous," which were formerly misapplied to the stems of monocotyledons and dicotyledons respectively.

Leaves also frequently branch, and when the branches are quite distinct the leaves are said to be compound. This branching is determined by the venation, which is the system of vein branching. Accordingly, branching leaves may be either palmately or pinnately compound. See LEAF.

BRANCHIOPODA, brān'ki-ōp'ō-da (Gk gill-footed, from βράγχια, *branchia*, gills + πούς, *pous*, foot), or EUPHYLLOPODA. A suborder of Entomostriaca, with numerous *branchia*, or gills, attached to the feet, water fleas. The term has been used by different authors in a most confusing manner, but the latest writers regard the group as a division of Phyllopoa. Used in this sense the Branchiopoda may be defined as phyllopods with numerous distinct trunk segments and numerous pairs of swimming feet. There are three families containing about a half-dozen genera. The families are distinguished by the carapace which is wanting in one, shield-shaped in the second, and bivalve in the third. These animals are popularly known as "fairy shrimps."

BRANCHIOSAURUS, brān'ki-ō-sa'rūs. See STEGOCEPHALIA.

BRANCHUS. See BRANCHIIDE.

BRANCO, brān'kō (Port white, Sp *blanco*, It *bianco*, Eng blank), Rio. The principal tributary of the Rio Negro, Brazil (Map, Brazil, E 3). It rises near the frontier of Venezuela in the Parima Mountains, flows southwest, is 375 miles long, and is navigable for most of its length by light-draught vessels.

BRAND, brānt, JAN HENDRIK (1823-88). A President of the Orange Free State, born in Cape Town and educated in England. In 1864 he was elected President of the Orange Free State and was successively reelected in 1869, 1874, 1879, and 1884. In 1876, at the request of Lord Carnarvon, he visited England for the purpose of taking part in a conference which had as its object the establishment of a confederation of South African states. He opposed the project, which consequently failed. On the occasion of the first conflict between the Transvaal and England he was successful in bringing about peace negotiations between Sir Evelyn Wood and the Boer representatives. Consult Charles de Coutouly, "Un homme d'état afrikanderiste Jan Hendrik Brand" in *Revue historique*, vol. LXVI (Paris, 1901).

BRANDE, WILLIAM THOMAS (1788-1866). An English chemist. He studied medicine, became a fellow of the Royal Society, and assistant to Sir Humphry Davy, whom he succeeded in the chair of chemistry at the Royal Institution in London, 1813. From 1816 to 1836 he and Faraday were joint editors of the *Quarterly Journal of Science and Art*. In 1853

he received the honorary degree of D.C.L. from Oxford. He was the author of several works. His manual of *Chemistry* (1819) was one of the best text-books of the time; but his reputation rests chiefly upon his *Dictionary of Science, Literature, and Art* (1842).

BRANDEGEE, FRANK BOSWORTH (1864-). An American legislator, born in New London, Conn. He graduated from Yale University in 1885, studied law, and was admitted to the bar. In 1888 he was elected to the Connecticut House of Representatives, and also in 1899, when he served as speaker. For 10 years he was corporation counsel for the city of New London. As delegate he attended four Republican National Conventions. He was elected to Congress in 1902 to fill an unexpired term, and was reelected in 1903 and 1905. On May 9 of the latter year he was chosen United States Senator to fill the unexpired term of O. H. Platt, deceased, and in 1909 was reelected for the term expiring 1915. As chairman of the Senate Committee on Inter-oceanic Canals, he warmly opposed the action of the Senate in 1912 in passing measures providing for the free passage of American ships through the Panama Canal.

BRANDEIS, brain'dis, FREDERICK (1835-99). An American organist and composer. He was born in Vienna, Austria, where he studied under Fischhof, Czerny, and Kufnatscha. In 1849 he traveled through the United States with the William Wallace Opera Company and settled in New York City in 1851. He was organist of the Roman Catholic churches of St. John the Evangelist (1865-70) and St. James (1871-86) in New York; of St. Peter and St. Paul's Church in Brooklyn (1886-98), and of the Forty-fourth Street Synagogue in New York (1898-98). His compositions include a prelude to Schiller's *Maria Stuart*; *The Sunken Cloister*, a ballad for chorus and orchestra; a suite for string orchestra; and many instrumental and vocal pieces.

BRANDEIS, LOUIS DEMBITZ (1856-). An American lawyer and publicist, born at Louisville, Ky. He was educated in Louisville, at Dresden, Germany, and, in law, at Harvard. Though successful in the practice of his profession, he became more widely known through his interest in economic, social, and political problems. He was one of the earliest advocates of the adoption of a radical policy of conservation by the government, supporting Gifford Pinchot (q.v.) in the latter's attack on R. A. Ballinger and acting as counsel for Luther R. Glavis in the Ballinger-Pinchot investigation. (See *ALASKA, History*; *Public Lands*, and *UNITED STATES, History*.) In 1910 he appeared for the shippers in the hearing held before the Interstate Commerce Commission, relative to an increase in the freight rates asked for by the railroads. He was also counsel (for the people) during the proceedings involving the constitutionality of the Oregon and Illinois ten-hour laws for women, and in the New York garment-workers' strike of 1910 he was chairman of the arbitration board. The various inquiries and investigations into the New York, New Haven & Hartford Railroad in 1912-13 brought from him a vigorous denunciation of the road's administration. He is author of many articles on public franchises, wage-earners' life insurance, and other economic subjects, and of contributions to legal reviews.

BRANDENBURG, brân'den-bôrk. A prov-

ince of central Prussia (Map: Prussia, E 2). Berlin, geographically within the province, forms a separate administration. The province corresponds in part to the former electorate of Brandenburg; its area is 15,383 square miles; pop. (Census of Dec. 1, 1910), 4,092,616. It is very flat, and in some parts marshy, with a slight elevation towards the southeastern end. Brandenburg is exceptionally well watered both by rivers and lakes and by canals. The chief rivers are the Oder, with its numerous tributaries, and the Elbe, with its navigable tributary, the Havel. Lakes are very numerous (between 600 and 700), and some of them are connected by canals with the larger rivers. The climate is cold and raw in winter and hot in summer. Brandenburg has a very sandy and sterile soil, and it is only by artificial means that it has been made productive. The area under tillage is very extensive; in 1912, 459,864 hectares were under rye, 88,653 wheat, 95,840 summer barley, 343,850 oats, 177,511 potatoes (largely for distilling), and 386,759 meadow. The approximate number of live stock in December, 1912, was: horses, 361,000; cattle, 891,000; sheep, 806,000; goats, 86,700; swine, 1,180,000. The chief mineral product is brown coal, of which Brandenburg yields about 8,000,000 tons annually, and the mining of which gives occupation to over 10,000 men.

The manufacturing industries are developed to a very high degree. Brandenburg contains extensive silk, woolen, linen, and cotton cloth and yarn mills, and numerous establishments for the dyeing, spinning, and printing of different textiles. There are also machine shops, cigar and cigarette factories, glass and chemical works. The production of spirits and beer is extensive, and the sugar mills produce large quantities of beet sugar. The manufacture of women's garments is a prominent branch of industry. Brandenburg is exceptionally well provided with transportation facilities. Besides its several navigable rivers and excellent canal system, it has about 3900 miles of roads; in 1911 there were 2520 miles of standard-gauge railway, of which 2147 miles were owned or operated by the state.

For administrative purposes, the province is divided into the two districts (*Regierungsbezirke*) of Potsdam and Frankfurt (Berlin being separate, as stated above). It sends 36 representatives to the Lower Chamber (*Abgeordnetenhaus*) of the Prussian Landtag, and 20 members to the Imperial Reichstag. The seat of the governor is at Potsdam, of the general commission at Frankfurt, and of the provincial Landtag at Berlin. (For further particulars as to local administration, see *PRUSSIA, Local Government*.)

The population of the province in 1871 was 2,036,888; in 1880, 2,200,825 (the increase being 11.9 per cent); in 1890, 2,541,783 (11.4); in 1900, 3,108,554 (20.1); in 1910, 4,092,616 (27.3). In 1910 Protestants numbered 3,676,693 (89.84 per cent); Roman Catholics, 300,320 (7.34); Jews, 61,343 (1.50). These figures do not include Berlin. The general tendency of the population to leave agriculture for manufacturing pursuits, so strongly marked in all the Prussian provinces, is especially pronounced in Brandenburg, where a large falling off in the agricultural population since 1882 is accompanied by a still larger increase in the manufacturing population.

The various nations of Teutonic origin which

inhabited Brandenburg at the beginning of the Christian Era were replaced during the age of migrations by a number of Slavic tribes, whom Charles the Great vainly attempted to subdue. Henry I succeeded in exacting tribute from them, and Otto I divided their country into two marks, but the Slavs (Wends, Lutits, etc.) were not fully overcome till the middle of the twelfth century, when Albert the Bear, who styled himself Margrave of Brandenburg, about 1140 established the supremacy of the Germans by peopling the region with colonists from Westphalia and the Netherlands. Under the successors of Albert the feudal authority of Brandenburg was extended over Pomerania, and territorial gains were made at the expense of Bohemia and Poland. Especially prosperous was the joint reign of the brothers John I and Otto III in the middle of the thirteenth century, in whose time the power of the nobles was greatly restricted and many cities were founded. From 1233 to 1411 the Margraviate was ruled by princes of the houses of Wittelsbach and Luxemburg, under whom it drifted into feudal anarchy and declined decidedly in wealth and power. In the Golden Bull of the Emperor Charles IV (1356) the Margrave of Brandenburg was recognized as one of the seven Imperial Electors. In 1411 Frederick of Hohenzollern, Burgave of Nuremberg, was given the government of Brandenburg by Sigismund and in 1415 was invested with the Margraviate and electoral dignity. Frederick and his successors crushed the nobility once for all, restored order, and extended the boundaries of their principality. The Reformation was introduced about 1540, and in the religious disputes of the succeeding period the electors of Brandenburg were leading champions of the Protestant cause. The greatness of Brandenburg may be dated from 1618, when John Sigismund became, through marriage, Duke of Prussia. In spite of the disasters of the Thirty Years' War, Brandenburg-Prussia, under the energetic rule of the Great Elector, Frederick William (1640-88), rose to the position of a leading state in northern Europe. In addition to Brandenburg and East Prussia, his dominions embraced the eastern and larger half of Pomerania, and the former sees of Halberstadt, Minden, and Magdeburg (all acquired in the Peace of Westphalia in 1648), together with Cleves, Maik, and Ravensberg, in the region of the Rhine and Westphalia. Under his son and successor, the Elector Frederick III (King Frederick I of Prussia), this realm was transformed at the very beginning of the eighteenth century (1701) into the Kingdom of Prussia, into whose history the history of Brandenburg is subsequently merged. Consult Brosen, *Geschichte der Mark Brandenburg im Mittelalter* (Leipzig, 1887), and Holtze, *Geschichte der Mark Brandenburg* (Tubingen, 1912).

BRANDENBURG (anciently, *Binnaborch* or *Brennabor*, from Slav *Brand*o, *Brann*y bor, from *brant*, war fight + *bor*i, forest). A city in the administrative district of Potsdam, in the Prussian province of Brandenburg, situated on the Berlin and Magdeburg Railway, about 37 miles west-southwest of Berlin (Map Prussia, E 2). The river Havel divides it into two parts, Old and New Brandenburg, both surrounded with walls. On an island in the river there is a third quarter, containing the castle, cathedral, and an academy for young noblemen.

There are five old churches, including the cathedral, containing interesting examples of architecture of the fourteenth and fifteenth centuries. Brandenburg has an extensive industry in the manufacture of basket ware, woollens, linen, hosiery, paper, leather, and beer. Boat building is also carried on to a considerable extent. Pop., 1900, 49,263, 1910, 53,595. Brandenburg became the seat of a bishopric as early as 949. From Nov 27 to Dec 5, 1848, Brandenburg was the seat of the National Assembly of Prussia.

BRANDENBURG, CONFESSION OF. A confession of faith prepared by order of John Sigismund, the Elector of Brandenburg, in 1614 with a view to reconciling the tenets of Luther with those of Calvin and to terminating the disputes provoked by the Augsburg Confession. It had authority in the churches of Brandenburg till the union of Lutheran and Reformed churches in 1817.

BRANDENBURG, NEU. See NEU-BRANDENBURG.

BRANDES, bran'dēs, CARL EDVARD COHEN (1847-) A Danish author, born in Copenhagen, a brother of Georg Brandes, and distinguished as a writer on dramatic and philosophic topics and as a dramatist. His best-known works are *Lagenvalder* (1881), *Helmskifte* (1880), *En Besuch* (1882), *En Bruch* (1885), *Liebe* (1887), *Under dem Gæst* (1890), *Under Loven* (1890), *Hos Sighurt* (1902), and the novels, *En Politiker* (1889) and *Das junge Blut* (1899).

BRANDES, bran'dēs, GEORG MORRIS COHEN (1842-) The first of Danish critics by genius, and one of the great systematic critics of literature in modern times, worthy to rank with the Frenchmen Sainte-Beuve, Taine, and Brunetiere. Even his books of travel are books of criticism, but it is with the wide currents of European thought that he concerns himself, rather than with any national achievements or with questions of formal aesthetics and technique. So his work at a time of national disturbance has been to preserve for the Danes a cosmopolitan intellectual horizon and a community of higher interests with their neighbors. He was born in Copenhagen, of Jewish parents, studied at the university there, traveled for several years, during which he became acquainted with many of the leaders of European thought, taught at the University of Copenhagen (1872-77), lived for five years in Berlin (1877-82), and has since resided, as a public lecturer with a subscribed guarantee of \$1000 a year, in Copenhagen. He wrote *Æsthetic Studies* (1868), *French Æsthetics* (1869), *Criticism and Portraits* (1870), *The Main Literary Currents of the Nineteenth Century* (1872-82). This was followed by *Danish Poets* (1877), *Ferdinand Lassalle* (1877, written in German), *Lord Beaconsfield* (1879, written in German), *Eminent Authors of the Nineteenth Century* (1882), *Men and Works in European Literature* (1883), *Berlin as an Imperial Capital* (1884), *Impressions of Poland* (1886), *Impressions of Russia* (1888), *Essays* (1890). His most recent works are *Poems* (1899), a remarkably fresh and sympathetic study of Shakespeare (1898), of which the English translation is in a second edition, and *Poland* (1903). Brandes is a scientific critic to whom literature is itself a "criticism of life"—a disciple of Comte and Taine, of Mill and Spencer. Naturally, therefore, he has moved in an atmosphere of controversy which has itself tended to awaken the national mind and has

given to much of his work a sort of challenging boldness. His great work, the *Main Currents* (latest ed., 1906), is in 6 vols. and gives a clear picture of the main tendencies of European literatures since the beginning of the nineteenth century. It treats first of the French "emigrant literature," revived by contact with England and Germany, at the hands of Châteaubriand, Madame de Staël, and Sénancour. From this he passes to the German romantic school, thence to the French reaction, and to what he calls "Naturalism" in England. This leads him directly to the French romanticists, and these to the so-called Young Germany beginning about 1830, with which the work has rested, great though incomplete, for many years. The collected *Works* of Brandes appeared at Copenhagen in 18 vols. (1899-1906). More recent publications are *Recollections of my Childhood and my Youth* (New York, 1906); *Erinnerungen* (1908).

BRANDING (AS, Brand, a burning, sword, Ger. a burning, brand). In Mercantile Law, the act of distinguishing goods by burning or stamping a distinctive mark into or upon them. In the case of manufactured articles, this practice has become a part of the matter of trademarks.

Branding of Animals, especially on the great ranches of the West, is commonly resorted to as a means of identification. When the cattle of various owners, who in many cases count their stock by the thousands, run on unfenced government range, the brand has been for years the only absolute proof of title and in most of the cattle States legal provision has been made for the registration and severe penalties provided for the altering of a registered brand. Calves are usually branded before they are weaned, the brand on the mother showing whose "iron" should be placed on her offspring. The brand is made on whatever part of the body may be convenient. The iron is heated to a dull red and applied just long enough to sear the hide and prevent the growth of hair. An iron too hot, or too long applied, will cause the brand to "blotch" or become illegible. Cattle thieves have developed the lucrative art of altering brands by clipping the hair, using hot wire, and branding with steam by means of a hot iron and a wet blanket. The requirements of a good brand are, that it be difficult to alter or conceal, easy to read or describe, and not so large as to disfigure and reduce the value of the hide. When letters of the alphabet are used as brands, they are often varied by the position they occupy; when tilted at an angle of 45°, they are said to be "tumbling"; when lying flat on their back or face, "lazy." See EARMARK; WATTLE.

In Criminal Law, a form of punishment employed in certain cases by the Greeks and Romans and adopted by the Canonists and by our Anglo-Saxon ancestors. In England laymen convicted of felony who claimed benefit of clergy, which exempted them from the ordinary penalties of the criminal law, were branded by burning with a hot iron in the brawn of the left thumb. As the benefit of clergy could be claimed only once, the brand, upon a subsequent conviction for felony, was evidence of the former conviction. By a statute of 21 James I. c. 6 (1623), women convicted of simple larcenies under the value of 10 shillings were burned in the hand, whipped, stocked, or imprisoned, for a first offense, instead of being executed. By later legislation (10 & 11 Wm. III. c. 23 (1699)

it was provided that such offenders should be branded on the cheek, but this barbarous enactment was repealed seven years afterward (5 Anne, c. 6). In 1695 the possession of coin clippings was made punishable by a heavy fine and by branding on the cheek. This method of punishment was practiced to some extent by the early Colonists in America, but is now obsolete, both here and in Great Britain. See BENEFIT OF CLERGY; PUNISHMENT.

BRANDIS, brân'dis, CHRISTIAN AUGUST (1790-1867). A German philosophical writer. He was born at Hildesheim. He took part in the preparations for the great critical edition of the works of Aristotle, contemplated by the Berlin Academy of Science (5 vols., Berlin, 1831-36), and with this object spent several years, along with Immanuel Bekker (q.v.), in exploring the chief libraries of Europe. In 1821 he was called to the new University of Bonn, where he edited Aristotle's *Metaphysics*, vol. i (Berlin, 1823), *Scholia in Aristotelem* (Berlin, 1830), and *Scholia Græca in Aristotelis Metaphysicum* (Berlin, 1837). He accepted in 1837 a call from the young King of Greece and spent several years in that country as Cabinet Counselor. As a result, we have his *Mitteilungen über Griechenland* (3 vols., Leipzig, 1842). Other works of his are *Handbuch der Geschichte der griechisch-römischen Philosophie* (3 vols., Berlin, 1835-66) and *Geschichte der Entwicklung der griechischen Philosophie und ihrer Nachwirkungen im römischen Reiche* (Berlin, 1862-64).

BRANDIS, SIR DETRICH (1824-1907). A German-English forester. He was born in Bonn, studied at the universities of Copenhagen, Göttingen, and Bonn, and in 1855 was appointed superintendent of the teak forests of Pegu. From that time until 1883 he was employed under the British government in the care of the forests of Burma and India, having been from 1864 inspector general of forests to the Indian government, and in 1887-90 had charge of courses on continental forestry in the Royal Indian Engineering College at Cooper's Hill, England. He completed L. Stewart's *Forest Flora of Northwest and Central India* (London, 1876), and also wrote an elaborate work on *Indian Trees* in 1906.

BRANDL, brân'dl, ALOIS (1855-). A German Anglicist, born in Innsbruck. He studied English philology in Berlin and London, was made extraordinary professor at Prague in 1884, and ordinary professor at Göttingen in 1888, at Strassburg in 1892, and at Berlin in 1895. His principal work is *Samuel Taylor Coleridge und die Englische Romantik* (1886; Eng. ed., 1887). He also contributed an interesting article on Middle-English literature to Paul's *Grundriss der germanischen Philologie*. In 1892 he became associate editor of the work entitled *Quellen und Forschungen zur Sprache und Kulturgeschichte der germanischen Völker*. He also wrote *Persönliche Eindrücke von Amerikanischen Universitäten* (1907) and *Geschichte der Allenglischen Literatur* (1908).

BRANDON. An enterprising city in Manitoba, Canada, 133 miles west of Winnipeg, on the Canadian Pacific, the Great Northern, and the Canadian Northern railways (Map: Manitoba, J 5). It is finely situated on a hill overlooking the valley of the Assiniboine and in 1912 had a good sewer system (21 miles), 42 miles of granolithic sidewalks, and stock yards of 12-carload capacity. Among the prominent institu-

tions are the courthouse, asylum for the insane, Dominion experimental farm, Indian Industrial School, and a college (Baptist). The city is an important railway centre, being a division point on the Canadian Pacific and the Canadian Northern, and has flour mills, saw mills, and grain elevators. It manufactures stove fittings, bricks, cement blocks, pumps, windmills, saddles, and threshing machines. Brandon was founded in 1881. Pop., 1901, 5620, 1911, 13,839.

BRANDON A town in Rutland Co., Vt., 15 miles north by west of Rutland, on the Rutland Railroad (Map Vermont, B 5). It has a public library and a fine high school. The chief industry of the town is the quarrying of marble. Pop., 1900, 2750, 1910, 2712.

BRANDT, brant, ENEVOLD, COUNT (1738-72). A Danish courtier. He was born in Copenhagen and studied law at the university of that city. He became assistant judge of the Supreme Court of Copenhagen in 1764, Royal Chamberlain in 1769, and afterward superintendent of the Royal Theatre. He acted as the companion of King Christian VII., but became involved in the catastrophe of Jan 17, 1772, and, together with his friend Struensee (qv), to whose advancement he had contributed, was condemned to death, his execution following on April 28, 1772.

BRANDT, HEINRICH VON (1789-1868). A Prussian general. He was born at Lakin, in West Prussia, and after pursuing legal studies in Berlin, entered the army as ensign in 1807. The Peace of Tilsit made him a subject of the Grand Duchy of Warsaw, and as such he fought in Spain and in the Napoleonic campaign in Russia. He was wounded in the battle of Leipzig and taken prisoner by the Russians, who forced him into the Polish army. He entered the Prussian army in 1816 and became a member of the general staff. He was connected with the Polish insurrections of 1831 and 1848, the latter of which he helped to suppress. He retired from the army in 1857, with the rank of general of infantry. In 1849 he had been elected to the Prussian Upper Chamber, and in the following year he was a member of the Erfurt Parliament. He was the author of a number of works on military subjects, including *Geschichte des Kriegswesens* (Berlin, 1830-35), *Grundzüge der Taktik der drei Waffen* (1833), *Der kleine Krieg* (2d ed., 1850). Consult *Aus dem Leben des General Brandt* by his son (2 vols., Berlin, 1882).

BRANDT, HENRI FRANÇOIS (1789-1845). A Swiss medalist. He was born at La Chaux-de-Fonds, Canton Neuchâtel. After a short apprenticeship he went to Paris, where he studied under David and the sculptor Bidaud and in 1812 was awarded the *Grand Prix de Rome*. In 1817 he was called to Berlin as chief engraver to the mint. Many of his medals represent important events in the history of Prussia. Though a conscientious artist and excellent in drawing, his work is somewhat cold and academic. A complete catalogue of the medals designed by him may be found in the *Publications of the Berlin Academy* for 1845.

BRANDT, HERMANN CARL GEORGE (1850-) A German-American scholar, born at Vilsen, Germany. He graduated in 1872 at Hamilton College, was an instructor there in 1874-76, and from 1876 to 1882 was associate professor of German at the Johns Hopkins Uni-

versity. In 1883 he was appointed professor of German language and literature at Hamilton. His publications include a German-English and English-German dictionary, an edition (1879) of the *Nathan der Weise* of Lessing, a *German Grammar* (1884), *German Reader* (1889), *German Science Reader* (1897).

BRANDT, JOSEF VON (1841-) A Polish historical and genre painter. He was born at Szczepieszyn, near Warsaw, and studied with Franz Adam and Piloty in Munich. Most of his pictures represent Polish military life of the seventeenth century, although several of the very best deal with the life of the Polish peasantry. They excel in the representation of movement and exuberant life, and in depicting the horses of the steppes. Among his important works are "Stefan Czarniecki and his Cavalry Crossing the Ice" (1870, Academy, Vienna), "Cossack Horses in a Snowstorm" (1885, Pinakothek, Munich), "Tartar Battle" (1906), and "The Runaway," which in 1900 received a prize in the National Academy, New York.

BRANDT, MARIANNE, family name MARIE BISCHOF (1842-) A German operatic singer. She was born in Vienna and was educated at the Conservatory in that city. She first attracted attention as Recha in *La Juive* and soon afterward accepted an engagement in Graz. From 1868 to 1886 she was associated with the Royal Opera in Berlin. In 1886 she went to New York, where she sang for several seasons the principal contralto rôles at the Metropolitan Opera House under Seidl. Gifted with a rich contralto voice of extraordinary compass and possessing exceptional histrionic gifts, Marianne Brandt was regarded, in her prime, as one of the greatest German contraltos of the century. As an admirable interpreter of Wagnerian rôles, she contributed largely to the success of the music festivals held in Bayreuth in 1876 and 1882. In 1890 she took up her residence in Vienna as a vocal teacher.

BRANDT, MAX AUGUST SCRIPTO VON (1835-) A German diplomat, the son of Heinrich von Brandt (qv), born in Berlin. After serving in the army, he was made in 1860 member of a diplomatic mission dispatched to the Far East. From 1862 to 1875 he was in Japan as a diplomatic representative, successively, of Prussia, of the North German Confederation, and of the German Empire. From 1875 to 1893 he was Minister at Peking. He wrote *Aus dem Lande des Zopfes* (1894), *Die Zukunft Ostasiens* (1895), *Sittenbilder aus China* (1895, 2d ed., 1900), *33 Jahre in Ostasien. Erinnerungen* (3 vols., 1901), *Fremde Früchte* (1904), *Der Chinese in der Familie und in der Öffentlichkeit wie er sich selbst sieht und schildert* (1912).

BRAND'Y (for older brandywine, cf. *Ger. Branntwein*, burned, distilled wine). A term sometimes applied generically to all kinds of ardent spirits, but usually restricted to the liquid obtained by distilling the fermented juice of the grape. The various fermented wines employed for this purpose contain from 7 to 13 per cent of their weight in alcohol, the white wines being preferred, as they possess a finer flavor than red wines. The yield of 1000 gallons of wine is from 100 to 150 gallons of brandy. The liquor varies in strength, but is commercially judged of according to the quantity of *eau de vie* or brandy *à preuve de Hollande* which it contains. It is generally diluted with water until it consists of from 50 to 54 per cent by

volume of absolute alcohol. When distilled, brandy is clear and colorless and will remain so if kept in glass vessels. But when placed in wooden casks the spirit dissolves out the coloring matter of the wood and acquires a light sherry tint, which dealers often make deeper by the addition of burnt sugar and other coloring matters. The pleasant aroma of brandy is due to the presence of more or less fusel oil (q.v.), accompanied by æthanolic ether. The most famous brandy is that known as Cognac, distilled in the departments of Charente and Charente-Inférieure, in the southwest of France. Because of the ravages of the Phylloxera insect, the manufacture of genuine Cognac has greatly decreased in France in recent years, while the manufacture of factitious Cognac has correspondingly increased. Brandy is also made in Spain and Portugal and, within recent years, in California. A second-class brandy is obtained from the refuse (*marc*) of the grapes left in the wine press, the scrapings of wine casks and vats, and the deposits of wine bottles. Very much of the brandy of commerce is a factitious product made from grain or potato spirit. In America brandy is made not only from fermented grapes, but also from apples (see **APPLE BRANDY**), pears, cherries, and peaches. For the production of brandy in the United States, see **LIQUORS, FERMENTED AND DISTILLED, STATISTICS OF**. See also **DISTILLED LIQUORS; ALCOHOL; ALCOHOL, PHYSIOLOGICAL EFFECTS OF**.

BRANDY STATION. A village in Culpeper Co., Va., about 56 miles southwest of Alexandria (pop., about 225), the scene of considerable fighting during the Civil War. Engagements between Federal and Confederate forces occurred here on Aug. 20, 1862, when the Federals made a notable cavalry charge; on June 9, 1863, when the Confederate general, Stuart, at the head of a cavalry force of about 10,000, won a tactical victory over a somewhat inferior force of Federal cavalry under Generals Pleasanton and Buford, the former losing 485 in killed, wounded, and missing, the latter, 907; on Sept. 13, 1863, and on Oct. 11, 1863. Various other skirmishes of minor importance were fought in this vicinity during the Chancellorsville and Gettysburg campaigns. The engagement of June 9, 1863, was of considerable strategic importance. It is often called the battle of Beverly's Ford.

BRANDYWINE, BATTLE OF. A battle fought at Chadd's Ford, Pa., on the Brandywine Creek, Sept. 11, 1777, during the American Revolution, between about 18,000 British under General Howe, and about 11,000 Americans under General Washington. Half the British army under Lord Cornwallis turned the right flank of the Americans by a forced march of 18 miles along the Lancaster Road, and drove back the American right under General Sullivan, while Knyphausen, with the other half, crossed at Chadd's Ford and forced the American centre and left, under Greene and Wayne respectively, back towards Dilworth and Chester. The Americans, though defeated, withdrew in good order, and the three divisions safely effected a junction at Chester. The American loss was estimated at about 1000, the British at about 600. Howe's victory enabled him to occupy Philadelphia, with little resistance, on the 26th, the Continental Congress adjourning first to Lancaster and then to York. Lafayette was severely wounded in this engagement. Consult Carrington, *Battles*

of the American Revolution (New York, 1877); Edward Channing, *History of the United States*, vol. iii (New York, 1912).

BRANFORD. A borough in a town of the same name, New Haven Co., Conn., 8 miles southeast of New Haven, on Long Island Sound, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, D 4). It manufactures malleable iron fittings, and wire. Oyster culture, fruit raising, and granite quarrying are carried on. The borough is a popular summer resort and contains the Blackstone Memorial Library. Branford, originally called Totoket, was settled in 1644 by a company from Wethersfield, Conn., which was soon afterward joined by another company, headed by Rev. Abraham Pierson (q.v.), from Southampton, L. I., and derived its later name from Brentford, England. In 1667 many of the settlers, dissatisfied with the union of the Connecticut and New Haven colonies, moved in a body to Newark, N. J., but others soon came in and took their places. In 1685 Branford received its patent from the Colony. North Branford was set off in 1831. The borough was incorporated in 1893. Pop. (town), 1900, 5706; 1910, 6047; (borough), 1900, 2473; 1910, 2560. Consult Rockey, *History of New Haven County* (New York, 1892).

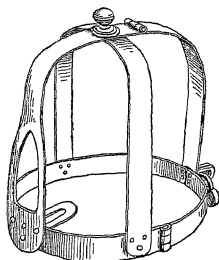
BRANGWAINE. The nurse of Yseult in the legend of *Tristan and Yseult*, modifications of which may be found in poems of Matthew Arnold, Swinburne, and Tennyson. In Wagner's music drama of *Tristan and Isolde* the spelling is Brangäne. She is, originally, the "Venus of the Northern Seas."

BRANGWYN, FRANK (1867-). An eminent English painter, etcher, and illustrator, born in Bruges. He studied in the South Kensington art schools and in the studio of William Morris, and afterward traveled extensively in the East. He paints broadly and freely, his color is vivid, and the subject is always subordinated to the general scheme of line and color. His etchings are conceived in surfaces and not in lines, with sharp contrasts of light and shade. Brangwyn is considered by many critics the most prominent and versatile master in contemporary British art. Among his large decorative works are mural paintings, illustrating "Modern Commerce," in the Royal Exchange, London, and a mural painting 50 feet long ("King John Signing the Magna Charta"), for the courthouse at Cleveland, Ohio. He was commissioned to decorate the East Pavilion at the Panama Exposition of 1915. His paintings include "The Convict Ship," "Burial at Sea" (Glasgow), "Venetian Funeral" (Leeds), "The Baptism of Christ" (Stuttgart), and "Mars and Venus" (Dublin). Among his etchings are "Old Houses, Ghent," "London Bridge," "The Sawyers," "The Building of Kensington Museum," and "The Paper Mill." An exhibition of his etchings was held in the Public Library, New York, 1914. He became president of the Royal Society of British artists and a member of the Royal Academy. The best monograph is by Shaw-Sparrow, *Frank Brangwyn and His Work* (London, 1910).

BRANICKI, bra-nits'ké, JAN CLEMENS (1689-1771). A Polish hetman, a great-grandson of the celebrated Czarniecki, and the last of a distinguished line of nobles. After a period of service in the French army, he returned to Poland, where in 1715 he joined the league against Augustus II. He became successively starost, standard bearer, hetman (1735), waywode

of Cracow (1746), and grand hetman (1752), and upon the death of Augustus III, encouraged by expectations of French support, he sought the crown of Poland, but the monarchical party represented by the Czartoryski controlled the Polish Diet of 1764, and by their command Branki was seized, deprived of all his honors and dignities, and banished from the country. He fled to Hungary, but returned upon the accession to the throne of his brother-in-law, Poniatowski, and thereafter lived in retirement on his estate.

BRANK (probably akin to *Ir brancas*, halter, pillory, Dutch *pranger*, fetter), or **SCOLD'S BRIDLE**. An instrument formerly used in England and Scotland for the punishment of notorious scolds and of women convicted of street brawling or of insulting public officers. It was an iron framework which was placed on the head, inclosing it in a kind of cage. In front



BRANK

was an iron plate, sometimes covered with spikes, which entered the culprit's mouth and prevented the use of the tongue. With this riddle on her head, the victim was led through the streets or chained to a pillory or market cross. On market days the instrument was exhibited in front of the house of the officer authorized to use it, as a warning to vixens. In some parts of Britain it continued to be used well into the last century. Its history is old and its various forms illustrated in Andrews, *Old-Time Punishments* (London, 1890). Consult also Earle, *Curious Punishments of Bygone Days* (Chicago, 1896).

BRANLE, *brân'l'*. An old French dance of the sixteenth and seventeenth centuries. It is written in 4-4 time, in moderate tempo, and always begins on the down beat.

BRAN'NAN, JOHN MILRON (1819-92). An American soldier. He was born in the district of Columbia, graduated at West Point in 1841, and in 1847, during the Mexican War, participated as first lieutenant in the various battles of the Southern campaign. In September, 1861, he was appointed brigadier general of volunteers and from January to March, 1862, commanded the Department of Key West. He served from June, 1862, to January, 1863, in the Department of the South, of which he was twice temporarily in command, and during this time commanded the St. John's River expedition (September, 1862), and took part in the battle of Pocotaligo during the Tennessee campaign of 1863. He commanded a division, participated in the battles

of Chickamauga and Chattanooga, and from December, 1863, to May, 1864, was engaged in reorganizing the artillery of the Army of the Cumberland. From May to October, 1864, he took part in the invasion of Georgia, and after the capture of Atlanta arranged the artillery for the defense of that place. At the close of the war he was brevetted major general of volunteers and both brigadier general and major general in the regular army, and subsequently served at various army posts, as lieutenant colonel and colonel, until 1882, when he retired from active service.

BRAN'NER, JOHN CASPAR (1850-) An American geologist and educator, who in 1913 became president of the Leland Stanford Junior University. He was born at New Market, Tenn., studied at Cornell University, and in 1875-77 was a member of the Imperial Geological Commission of Brazil. From 1882 to 1883 he was agent in Brazil for the United States Department of Agriculture, and from 1883 to 1885 Topographical Geologist of the Pennsylvania Geological Survey. He was appointed professor of geology at the University of Indiana in 1885, in 1892 was called to a similar chair at the Leland Stanford Junior University. From 1887 to 1893 he was State Geologist of Arkansas and in his official capacity was an important factor in the development of the mineral resources of that State. In 1899 he directed a geological expedition to Brazil and in the same year was appointed vice president of the Leland Stanford Junior University. He was special assistant of a geological survey of Brazil in 1906-07 and directed a second scientific expedition to that country in 1911. Among his publications are *Annual Reports of the State Geologist of Arkansas* (1887-1901), "Cotton in the Empire of Brazil," *United States Department of Agriculture, Miscellaneous Special Reports* (1885), "Bibliography of Clays and the Ceramic Arts," *United States Geological Survey Bulletin, No. 143* (1896), *From School to College* (1905), *Geologic Work of Ants in Tropical America* (1911).

BRANT (probably refers to the dark color, meaning something burnt, of *brand*). The name given to various species of goose of the genus *Branta*. The brants may be recognized by the black cheeks and chin taken in connection with the white patches or streaks on the sides of the neck. They are considerably smaller than the common wild goose, and fly less rapidly, in more compact groups, and without a chosen leader. The common brant (*Branta bernicla*) is found throughout the northern portions of the whole Northern Hemisphere. It breeds in the far north, well within the Arctic Circle, but migrates southward in Europe and eastern North America on the approach of winter. The nest is made on the ground, from grasses, moss, etc., and is lined with feathers. The eggs are said to be creamy white in color and only four in number. The brant, though occasionally seen in the interior of the United States, is chiefly marine, and is most abundant in shallow bays along the coast, rarely as far south as the Carolinas. It is rather sluggish in its movements, seldom taking to flight unless alarmed. It rises from the water slowly, and often returns to the same point whence it started, unless attracted by another flock. It feeds chiefly on vegetable matter, the so-called "eelgrass" (*Zostera*) furnishing a large part of its diet. It pulls this

at low tide, diving and tearing it up with its beak; and then, as the tide rises and it has to give up this method of work, it floats lazily on the water, enjoying the feast which it has earned. For the eelgrass, when pulled, floats, and so the bird can feed on it at leisure after the water is too deep for agreeable diving.

In the western part of the United States the common brant is replaced by the black brant (*Branta nigricans*), in which the lower breast and upper part of the belly are nearly as dark as the back. The black brant breeds with the common brant in the Arctic regions; but in migrating southward it resorts to the Pacific Coast and the Western States and is rarely seen in the East. The name is sometimes given to other species of goose, and the common brant is often confused with the barnacle goose (q.v.)—a very rare, accidental visitant in the United States. The snow goose (q.v.) is sometimes called "white brant," but it is not properly a brant, which it resembles only in size. See GOOSE, and PLATE OF DUCKS (WILD).

BRANT, JOSEPH (THAYENDANEGEA) (c.1742–1807). A celebrated Mohawk Indian chief. When very young he became a favorite of Sir William Johnson, who sent him to Dr. Eleazar Wheelock's school, at Lebanon, Conn., out of which later grew Dartmouth College. Here he obtained a fair education and joined the Episcopal church, of which he remained a member throughout life. For some time he was a missionary among the Mohawk Indians, and he translated into their language the Prayer Book and parts of the New Testament. He was early distinguished for his physical prowess and rendered valuable services to the English in both the French and Indian and the Pontiac wars. In 1774 he became the secretary of Guy Johnson, superintendent of Indian affairs, and throughout the Revolutionary War he served against the Americans, leading numerous sanguinary raids, participating in the Cherry Valley and Minisink massacres and taking an active part in the battle of Oriskany. He was not, however, present at the Wyoming massacre, as he is represented to have been in Campbell's *Gertrude of Wyoming*; and he seems for the most part to have treated his captives with great humanity and to have steadfastly opposed and, wherever possible, prevented torture. After the war he used his influence to preserve peace between the various Indian tribes and the whites. In 1786 he visited England, where he was entertained by many persons of prominence and became acquainted with such men as Burke and Sheridan. With money collected on this trip he built the first Episcopal church erected in Upper Canada. John Fiske has said of Brant that he "was perhaps the greatest Indian of whom we have any knowledge," and that "certainly the history of the red men presents no more many-sided and interesting character." Consult: Stone, *The Life of Joseph Brant-Thayendanegea, Including the Indian Wars of the American Revolution* (new ed., Albany, 1865); Eggleson and Seelye, "Brant and Red Jacket" in *Famous American Indians* (New York, 1879); Macdonnell, "Brant and the Butlers" in the *University Magazine*, vol. vii (Montreal, 1908).

BRANT, or BRANDT, BRÜNT, SEBASTIAN (c.1458–1521). A German satirist and humanist. He was born in Strassburg, the son of a wealthy burgher. He studied philosophy and jurisprudence at the University of Basel, taught

and practiced law there, and removed to Strassburg, where he became town clerk in 1501, in which office he served his native city well till his death. From Emperor Maximilian he received a title and a pension. He took an important part in negotiations with the Holy See. Brant achieved fame through his satirical poem, *Das Narrenschiff* ('The Ship of Fools'), published in 1494, one of the most remarkable and popular books of the time. The dialect is Alsatian and the form the short-rhymed couplet. *The Ship of Fools* (Narrenschiff) is supposed to have suggested Erasmus' famous *Praise of Folly* and was a sort of *Pilgrim's Progress* to its generation. It was a mirror to those perplexed times, and in Locker's Latin translation it was carried far beyond the borders of Germany. Neither the fiction of the ship nor the treatment of it was entirely new, but the great popularity of the book came perhaps from the very general character of the satire scourging alike real sin and innocent error, from the fortunate placing of the numerous and pointed woodcuts, and from the many well-chosen quotations from Scripture and from Latin authors. He invites to passage in his "Ship of Fools" representatives of every class—the misers, the gluttons, the churchgoers for show and the churchgoers for respectability, the pedantic and the frivolous, "from beardless youth to crooked age," knights and ladies, cooks and butlers, gamblers, drunkards, spendthrifts, merchants, alchemists, and lovers, in motley and ever-changing throng. So all classes saw themselves in his picture and read with a twinge at their own and a smile at others' folly, "the first printed book that dealt with contemporary events and living persons, instead of old German battles and French knights" (Max Müller). But Brant was no poet, nor did he have much milk of human kindness in his chastisement of poor mortals. Contemporary writers made constant allusions to it; monks preached from its texts; fifteen years after its appearance it was done into English by Barclay (London, 1609), and again by Henry Watson, as *The Grete Shyppe of Fooles of the Worlde* (1517). Barclay's edition has been edited by Jamieson (Edinburgh, 1874). The best German editions are by Zarneke (Leipzig, 1854), with an extensive commentary, and popular editions by Goedecke (Leipzig, 1872) and Bobertag in *Kürschner's Nationalliteratur*. Consult Claus, *Rhythmik und Metrik in Sebastian Brants Narrenschiff* (Strassburg, 1911).

BRANTFORD. The chief city and the county seat of Brant Co., Ontario, Canada, 70 miles east of London, on the Grand Trunk, the Michigan Central, the Canadian Pacific, and other railways, and on the Grand River (Map: Ontario, C 4). The city has fine buildings and churches and a public library and is the seat of the Ontario Institution for the Education of the Blind. It is best known as the home of the telephone, Professor Bell having invented the instrument at Tutela Heights, near the city. The manufacturing interests are extensive, the most important products being agricultural implements, engines, wagons, envelopes, paper boxes, bricks, felt and rubber goods, foundry products, engines and boilers, etc. The industries number more than 70. The town is supplied with natural gas and with electric power from Niagara Falls. The United States has a consular agent here. The city was named after the famous Mohawk chief Thayendanegea, Joseph Brant, to whom a fine monument was

erected in Victoria Square in 1887 Pop, 1901, 16,619, 1911, 23,132

BRANTÔME, bran'tom', PIERRE DE BOURDEILLES, ABBE DE (c1540-1614). A French courtier and chronicler. He was born in Perigord, and as the third son of a nobleman he was dedicated in youth to the Church, but presently became a page of the liberal and literary Margaret of Navarre. On her death (1549) he studied in Paris, served Francis of Guise, and became gentleman of the chamber to Charles IX. Then, with the exception of time spent in diplomatic missions, of which the escort of Mary Stuart to Scotland is noteworthy for the fine description that he gives of it, and in campaigns and traveling for pleasure, he passed his life at the courts of Henry III and IV, till his retirement to his ancestral estate (1594). Here lawsuits with monks and neighbors occupied his last years, and he relieved himself from the ennui they caused by reminiscent memoirs, *Vies des hommes illustres et des grands capitaines français*, *Vies des dames illustres*, *Vies des dames galantes*, *Anecdotes touchant les duels*, *Rodomontades et jurements des Espagnols*, a Life of his father, a funeral oration on his sister-in-law, and some insignificant verses. His manuscripts were not printed until 1865. The best of many editions is by Lalanne (10 vols., 1885-81). Brantôme recognizes only two social essentials—to be born an aristocrat and to hate Huguenots. Indifferent to honor and morality, he is an impartial witness to the vice and crime of his epoch. None has mirrored more truly the Valois court or its terribly depraved moral ideals. Consult Lalanne, *Brantôme, sa vie et ses écrits* (Paris, 1897). In 1904 the Ecole des Chartes collected all Brantôme's manuscripts. Consult also K. P. Wormeley's translation of Brantôme's *Illustrious Dames of the Court of the Valois Kings* (New York, 1912).

BRAS/DOR'S OPERATION. It is stated in the article ANEURISM that a cure is effected in that disease by successive layers of the fibrin of the blood being deposited in the aneurismal sac. It was suggested by Brasdor, an English surgeon, that the course of the blood should be impeded by a ligature upon the artery beyond the aneurismal sac. Brasdor, in 1826, first performed the operation successfully. See ANEURISM.

BRASE/NOSE COLLEGE. A college at Oxford, England, founded about 1509 by William Smith, Bishop of Lincoln, and Sir Richard Sutton—the last of the pre-Reformation colleges. The name is said to have come from *Brassenhus* (brewhouse), a building which previously stood on the site, and the corruption becomes at once facetious and plausible from the significant knocker, in the form of a brazen nose, which hangs over the old entrance. The new buildings on the High Street are among the best examples of modern collegiate architecture. The college accommodates about 150 undergraduates. Among its members have been Burton (author of the *Anatomy of Melancholy*), Ashmole (founder of the Ashmolean Museum), Foxe (author of the *Book of Martyrs*), Bishop Heber, Dean Milman, and Barham (author of the *Ingleby Legends*). Here, too, Walter Pater was tutor. Besides good standing as a college, Brasenose has been fortunate in her athletics, particularly boating.

BRASHEAR, brash'er, CITY. See MORGAN CITY.

BRASIDAS (Gk *Bpasidas*). A distinguished

Spartan general of the fifth century B.C., especially notable for his courageous conduct in the Peloponnesian War. For his successful relief of Methone, in Messenia, under siege by the Athenians (431 B.C.), he was made a chief magistrate of Sparta. He brought relief in 424 to Megara and, marching through Thessaly, subdued a number of Macedonian cities. Under great disadvantages he won, in 422, a signal victory over Cleon (qv) at Amphipolis, but both generals were mortally wounded. He was buried within the walls of Amphipolis. He was long honored there as a hero, and his memory was celebrated in yearly games and sacrifices. To his worth his enemies bear witness. Thucydides extols his civic virtues, and Plato mentions him with Achilles.

BRASS (AS *bras*, probably related to Icel *brasa*, to harden by fire, Swed *brasa*, to fire). An alloy of copper and zinc, considered the most important of all alloys. It was distinctly known to the ancients, as shown by its mention in the Old Testament and in the works of Pliny, though, according to some authors, the alloy of the ancients was a variety of bronze, or a mixture of copper and tin. Natural brass was early used and was known as *orichalcum*. During the Middle Ages brass was made in Germany, chiefly in sheets, which found extensive use in churches. The original method for its production, called the *cementation process*, was by heating copper in the form of shot or sheet in crucibles in contact with zinc, or with calamine and carbon, resulting in the volatilization of the zinc and its subsequent absorption by the copper. The brass thus obtained was melted down and cast. In 1781 a process for the direct production of brass from copper and zinc was patented by James Emmerson, whose method has since entirely superseded the old process, owing to its greater simplicity. Emmerson's method consists essentially in first melting the copper in a crucible, then adding the zinc in small quantities, and stirring until the two metals are thoroughly mixed, after which the molten brass is cast into molds of sand or iron. Brass has a fine yellow color, which becomes darker as the proportion of copper is increased, and is capable of receiving a fine polish. It is harder than copper and hence better adapted to resist wear. Brass is both malleable and ductile and therefore may be rolled into thin sheets or drawn into fine wire. It resists the influence of the atmosphere better than copper, but tarnishes if not protected by a lacquer or varnish. Brass comes into commerce chiefly as cast, sheet, wire, and tubes. The proportions of its two constituents vary from 10 parts of copper and 1 of zinc, forming a reddish-yellow brass, all the way to 1 part of copper and 5 parts of zinc, forming a very dark-gray alloy. The composition of brass is regulated with a view to the purpose for which the alloy is to be employed. The proportions of the more important kinds are as follows: *Button brass*, 8 parts copper with 5 parts zinc, *fine brass*, 2 parts copper with 1 part zinc, *fine casting brass*, 90 parts copper, 7 parts zinc, 2 parts tin, and 1 part lead, *gilding brass*, 64 parts copper, 32 parts zinc, 3 parts lead, 1 part tin, *malleable brass*, 3 parts copper with 2 parts zinc, *soldering brass*, 12 parts fine brass, 6 parts zinc, 2 parts lead, *wire brass*, 72 parts copper, 28 parts zinc. Some of the most important kinds of brass have special names, thus *Auch's metal* is brass composed of 60 parts

copper, 38.2 parts of zinc, 1.8 part iron; *bath metal* is 5 parts of copper and 1 part of zinc, *Bristol brass*, 61 parts of copper, 39 parts of zinc, *orovide*, or *French gold*, 9 parts copper, 10 parts zinc; *Mannheim gold*, 2 parts of copper, 1½ parts zinc; *Muntz's metal*, 10 parts copper and 12 parts zinc; *Pinchbeck*, 88.8 parts copper, 11.2 parts zinc; *Prince's metal*, 75 parts copper and 25 parts zinc; *similar*, from 6 to 9 parts of copper with 1 part of zinc. An excellent brass solder consists of equal parts of copper and zinc, 1 part of silver being added for finer kinds of work.

BRASS, SALLY. A character in Dickens's *Old Curiosity Shop*, who delighted in starving the Marchioness. She was an abler scoundrel than her brother and affected masculine ways and attire. She and Dick Swiveller struck up a curious negative sort of friendship.

BRASS, SAMPSON. The brother of Sally Brass in *The Old Curiosity Shop*, by Dickens. He was Quilp's legal tool and could either bully or cringe, as occasion required. His attempt to ruin Kit, however, resulted in his own and his sister's downfall.

BRAS-SARTS (Fr. *brassart*, from *bras*, arm, Eng. *brace*). Parts of plate armor used to protect the upper part of the arms and to unite the shoulder and elbow pieces. When half of the upper arm only was shielded, the pieces were called *demibrassarts*. Brassarts was sometimes used to designate the whole protection for the arm.

BRASSES, SEPULCHRAL OR MONUMENTAL. Flat tombstones, partly or wholly of metal, used generally during the thirteenth and following centuries. They were set in the pavements of churches and were made of brass or of a mixed metal called *latten* (Fr. *laiton*), the design being marked by incised lines in the metal, filled in with a black or dark resinous enamel. The brilliancy of the metal was sometimes enhanced by gilding and damascening. These sepulchral slabs were of two classes:

(1) Marble or stone slabs to which the brass ornamentation was attached as to a ground, the brass forming the figure of the deceased in the centre of the slab, as well as the ornaments, framework, armorial bearings, and inscription, each inserted as a separate piece of metal into cuts (or casements) made in the stone ground. (2) Slabs entirely of metal, which appear to be of a single piece, but are really composed of several sheets carefully joined, and decorated in the same style as the first class. Such brasses were used almost exclusively in England and Flanders, very seldom in Germany and northern France, not at all in Italy. Those of the first class alone were common in England; those of the second, which were far rarer, more artistic and expensive, are found mainly in Flanders, where they were produced as late as the seventeenth century, and they alone have the rich, detailed ornamentation in damascened work. The works of this sort in France have been barbarously destroyed. In England many remain. There the earliest are among the most artistic—those of Sir John d'Aubernoun at Stoke Dabernon (1277), of Sir Roger de Trumpington at Trumpington (1280), and of Sir Richard de Buslingthorpe at Buslingthorpe (1290), all very similar in style. More advanced Gothic is the 1325 slab of Sir John de Creke at Westley Waterless. England probably owed most of such works to artists from Flanders, the north of

France, and Burgundy. Among the fine sepulchral brasses in the cathedral of Bruges, that of Sire Martin de la Chapelle (1452) is a beautiful example of the damascened work. There is a close relation between the sepulchral brasses and other and earlier kinds of work, especially the bronze church doors of Byzantine art in which the design was made out in the same way by incised lines filled with enamel (see *Door*), and also the plain marble funeral slabs, common throughout Europe, especially Italy, where the design was similarly outlined. (See *Tomb*.) In a few cases the brasses were not set flush with the pavement, but were either set up vertically against the wall or raised on a basement like a simple cenotaph. They must not, then, be confounded with sepulchral monuments in cast bronze.

Bibliography. Among *Manuals* for the study of the subject are those of Haines (2 vols., London, 1861) and Macklin (ib., 1890). For the *Monumental Brasses of England*, consult the works of Boutell, with folio wood engravings (London, 1840), Waller (ib. and Oxford, 1803), and Macklin (ib., 1907). Those of many of the counties have been separately published. For *Continental Brasses* consult the published facsimiles by Cremy (ib., 1880).

BRASSEUR DE BOURBOURG, brá'sér' de bô'r'bô'r', CHARLES ETIENNE, ABBÉ (1814-74). A missionary and archaeologist. He was born in Bourbourg, France, went to the United States in 1846, and was for a time Catholic vicar-general at Boston. Two years later he entered upon his missionary labors in Mexico and Central America, which continued in connection with his studies of the ancient civilizations of that region until 1864, in which year he served as archaeologist to the French expedition to Mexico. His numerous published works were compiled from materials gathered in the field and from studies of ancient manuscripts in the archives of Madrid. Besides his monumental *History of the Civilized Nations of Mexico and Central America during the Centuries Anterior to Christopher Columbus*, published in Paris, 1867-69, he is the author of numerous linguistic, archaeological, and historical works relating to the same region.

BRASSEY, THOMAS (1805-70). An English surveyor, widely known as a railway promoter of great capacity and enterprise. At the age of 16 he became apprentice to a surveyor, who later set him up in business. His first railway contract was for a portion of the Grand Junction; then he completed the London and Southampton, with contracts involving \$20,000,000. In 1840, with a partner, he built the railway from Paris to Rouen, and was concerned in five other French lines and as many in England. The capital involved in his contracts at this period was equal to \$175,000,000. He also built railways in Holland, Prussia, Spain, and Italy, and then undertook the Grand Trunk of Canada, 1100 miles in length, with the great bridge over the St. Lawrence at Montreal. Subsequently his labors were found in almost every country in Europe, India, Australia, and South America. Although he received many honors, he was modest and simple in his tastes and manners. Consult Sir Arthur Helps, *Life and Labors of Mr. Brassey* (London, 1872).

BRASSEY, THOMAS BRASSEY, G.C.B., first EARL (1836-). An English politician, son of Thomas Brassey (q.v.). He was born at Staf-

ford, England, and was educated at Rugby and at University College, Oxford, graduating with honors. He was elected to Parliament for Devonport in 1865, represented Hastings from 1868 to 1886, was appointed Civil Lord of the Admiralty in 1880 and was secretary to the Admiralty in 1883-85. He was Governor of Victoria from 1895 to 1900 and became Lord Warden of the Cinque Ports in 1908, a post which he resigned in 1913. He founded *Brassey's Naval Annual* and wrote *Work and Wages* (1872), *The British Navy* (5 vols., 1882-83), *Lectures on the Labor Question* (1878), *Sixty Years of Progress* (1904, 3d ed., 1912). His first wife, Lady Anna (Allnutt) Brassey, accompanied him on his journey around the world and published *The Voyage of the "Sunbeam"* (1877), *Sunshine and Storm in the East* (1878), *The Trades, the Tropics, and the Roaring Forties* (1884). She died at sea, 1887.

BRASSICA See CABBAGE

BRATHWAITE (also BRATHWAIT), RICHARD An English poet (1588-1673), educated at Oxford and Cambridge, lived in London and Westmoreland, his native county. Among his numerous volumes of verse are: *The Golden Fleece* (1611), *The Poet's Willow*, pastorals (1614), *A Stappado for the Devil*, satires (1615), *Nature's Embassy*, odes and pastorals (1621), and the long-popular *Barnabee's Jurnall* (1638), in English and Latin doggerel, famous for the Puritan who hanged his cat on Monday for killing a mouse on Sunday. Consult *Barnabee's Jurnall*, ed. Hazlitt (London 1876), *Law of Drunkenness* (New Haven, 1903). Brathwaite has been the subject of a vast number of monographs, of which a bibliography, completed to 1876, was made by Haslewood and Hazlitt.

BRATTIANU, bra-ti-an', JOAN (1821-91). A Rumanian statesman. He was born at Pitești and studied in Paris, where he took an active part in the student gatherings and republican manifestations which preceded the Revolution of 1848. Soon after his return to Bucharest he became one of the active instigators of the revolution which led to the deposition of the hospodar, George Bibesco. His radicalism and his prominence in the provisional government led him to advocate independence and oppose all schemes which had for their aim the placing of Wallachia under a Russian protectorate. In the same year, when repressive steps were taken by Russia and Turkey, he was seized, with several other leaders of the revolutionary party, and for 15 days retained as a prisoner upon a miserable bark on the Danube. Condemned to exile, he returned to Paris, where he remained until the affairs of the Danubian principalities had been adjusted in the Peace of Paris (1856). Upon the accession of Prince Charles of Hohenzollern to the Rumanian throne, Brattianu became Minister of State, but was compelled to resign in 1868. Reinstated in 1876, he entered into an alliance with Russia against Turkey in 1877, proclaimed the independence of Rumania, May 21, 1877, and its establishment as an independent kingdom, March 26, 1881. In 1883 he resigned as President of the Ministry, his fall being largely due to the intrigues of his brother Demeter, who succeeded him. His writings include *Mémoire sur l'empire d'Autriche dans la question d'Orient* (1855), and *La question religieuse en Roumanie* (1866).

BRATSCHKE, brát'she The German name for the viola. (q.v.)

BRATTIA See BRAZZA

BRATTICE (OF *bietsche*, *bietsche*, Ger *Brat*, AS *bied*, board, plank) The term applied to any partition erected for deflecting air currents in mines. Such partitions are more commonly used in coal than in metal mines. The partition is usually made of thin boards or of canvas and is erected along an entry or room dividing it into two air ways so that the fresh air will be obliged to travel on one side of the brattice and the air contaminated with gas or smoke will travel on the other side to the exhaust. A temporary brattice is often constructed by nailing brattice cloth or heavy duck canvas to upright posts set from 4 to 6 feet apart along one side of an entry a short distance from the rib or pillar.

BRATTLEBORO, brát'tl-bór'ò A village, in a town of the same name, in Windham Co., Vt., on the Connecticut River, 80 miles north of Springfield, Mass., and on the Boston and Maine and the Central Vermont railroads (Map Vermont, D 8). It has a picturesque site and contains a fine public library and a Retreat for the Insane, a Home for the Aged and Disabled, and the Austine Institution for the Blind, Deaf, and Dumb. The principal manufactures include children's carriages and toys, furniture, overalls, shoe lasts, stamping and sealing machines, cotton goods, and organs, the factories of the Estey and Carpenter organ companies being situated here. Brattleboro was chartered in 1753 and derives its name from William Brattle of Massachusetts, one of the original grantees. Pop., 1900, 5297, 1910, 6517. Consult Burnham, *Brattleboro* (Vt.) *Early History with Biographical Sketches* (Brattleboro, 1890), Howard, *Brattleborough in Verse and Prose* (Brattleboro, 1885).

BRATTON, HENRY DE See BRACTON

BRAUN, broun, ALEXANDER (1805-77). A German botanist. He was professor of botany in the universities of Freiburg, Giessen, and Berlin, successively, and was director of the Berlin Botanical Garden. Although he contributed largely to our knowledge of the morphology of many groups, all of his writings are permeated with the idealistic nature philosophy of his time. His influence as a teacher was very great, and as an investigator he stood in the first rank. Consult Mettemeyer, *A Brauns Leben* (Berlin, 1882).

BRAUN, AUGUST EMIL (1809-56). A German archaeologist, born in Gotha. He studied in Göttingen, Munich, Berlin, Dresden, and Paris. With Gerhard he went to Rome in 1833, and in a short time was made librarian and subsequently secretary of the Archaeological Institute. Later he founded there a galvanoplastic establishment, from which issued many reproductions of antique art objects and casts of modern works. Among his many valuable works on art may be mentioned *Il giudizio di Paride* (1838), *Kunstvorstellungen des geflügelten Dionysos* (1839), *Antike Marmorwerke* (1845), *Griechische Götterlehre* (1851-55), *Vorschule der Kunstmythologie* (1854, Eng. trans. by Grant, 1856), and an admirable guidebook, *Das Römische und Museen Roms* (1854, Eng. trans., 1856).

BRAUN, FERDINAND (1850-) A German physicist, born at Fulda, and educated at the Fulda gymnasium and the universities of Marburg and Berlin. From the latter he received the degree of Ph.D. in 1872 with a dissertation on the vibration of cords. For some years

he filled various academic positions at the universities of Würzburg, Marburg, Strassburg, and Tübingen (where he was professor of physics for a decade). In 1895 he became professor of physics and director of the Physical Institute at the University of Strassburg, and there he remained in spite of a call to succeed the late Gustav Wiedemann (q.v.) at Leipzig. With Marconi he received the Nobel prize for physics in 1909. His researches in electricity resulted in a cathode ray tube and many improvements in radio-telegraphy, especially by making use of the principle of resonance to effect syntonization in the circuit. In 1902 he discovered a method for increasing at will the energy of the sending station; and he succeeded in gaining control of the direction of the effective radiation by the arrangement of the antenna. His many improvements in wireless telegraphy were acquired by the Telefunken Company as a part of their extensive system of patents. His researches were also concerned with the electro-magnetic theory of light and with fine metallic gratings. See WIRELESS TELEGRAPHY.

BRAUN, JULIUS (1825-69). A German archaeologist. He was born in Karlsruhe and studied at the universities of Heidelberg and Berlin. At first a lecturer in the University of Heidelberg, he afterward went to Tübingen and finally to Munich, where he lectured in the Academy of Arts. Both in his books and in his lectures he maintained the thesis that the really fundamental principles of art and religion were derived from the Egyptians and were transmitted, through the Semites, Greeks, and Romans, to the Germanic and other northern peoples. He wrote: *Studien und Skizzen aus den Ländern der alten Kultur* (1854); *Geschichte der Kunst in ihrem Entwicklungsgange, etc.* (1873); *Naturgeschichte der Sage* (1865); *Historische Landschaften* (1867); *Gemälde der mohammedanischen Welt* (1870).

BRAUN, KARL (1822-93). A German statesman and author. He was born at Hadamar, in the Duchy of Nassau, and studied classical philology and history at Marburg, and law and political economy at Göttingen. He was president of the Nassau Chamber of Deputies from 1859 to 1866, and as the leader of the Liberals advocated German unity and industrial freedom. He was one of the founders of the *Volks-wirtschaftlicher Kongress* and was elected its permanent president in 1859. In 1863 he established the *Vierteljahrsschrift für Volkswirtschaft und Kulturgeschichte* and edited this publication until 1887. As a deputy in the Reichstag he was successively identified with the National Liberal, Secessionist, and German Liberal parties. Among his works are the volumes entitled *Bilder aus der deutschen Kleinstaaterei* (5 vols., 3d ed., 1881), his most famous work, and also *Mordgeschichte* (2 vols., 1874); *Eine türkische Reise* (3 vols., 1876-78).

BRAUN, KASPAR (1807-77). A German wood engraver and draughtsman. He was born at Aschaffenburg and studied at the Academy in Munich, where he began as a painter of fantastic landscapes and genre pictures. After experimenting with various techniques he turned to wood engraving and in conjunction with Desauer established the xylographic institute in Munich, which soon became celebrated and counted among its students a large number of the greatest modern German wood engravers. With Friedrich Schneider he established in 1843

the famous firm which published the numerous periodicals *Fliegende Blätter*, the *Leipziger Illustrierte Zeitung*, the *Münchener Bilderbogen*, and many other publications to which prominent German artists contributed their drawings.

BRAUN, LOUIS (1830-). A German battle and genre painter. He was born at Schwäbisch Hall, Württemberg, and studied painting in Munich under his brother and Bernhard Nelsner, and in Paris under Horace Vernet. He took part in the Danish War of 1864, in the Austro-Prussian War of 1866, and the Franco-German War of 1870-71. The studies he was thus able to make were afterward worked up into large pictures of historic truthfulness and picturesque effect, such as: "The Market Place of Attigny" (Museum of Königsberg), "The Entrance of the Germans into Orleans," "The Battle of Sedan," "The Germans in Versailles," and "The Entry of the German Army into Paris." The great success of the "Battle of Sedan," in panoramic form, induced Braun (who in 1902 held a professorship in Munich) to produce several other works of the same description. Among these are the "Battle of Mars la Tour" (1884), "Panorama of the German Colonies" (with Petersen, 1885), and the "Battle of Lützen" (1892). His elder brother, REINHOLD BRAUN (1821-84), animal and genre painter, was born at Altensteig, Württemberg, and studied painting and lithographing in Stuttgart and later in Munich. He is especially well known for representations of horses, the coloring and delicate execution of which earned for him the name of the "Swabian Wouwermann." His genre scenes of Swabian life are very popular and have often been reproduced in woodcuts and photographs. He is represented by several characteristic works in the museums of Leipzig, Munich, and Stuttgart.

BRAUNE, bra'ne, CHRISTIAN WILHELM (1831-92). A German anatomist. He was born in Leipzig and studied at the universities of Göttingen and Würzburg. In 1872 he became professor of topographical anatomy at the University of Leipzig. In his scientific investigations Braune devoted himself particularly to the mechanical physiological side of anatomy, particularly as regards the movements of the joints and the equilibrium of the body in their bearing upon the equipment of the infantry. He also introduced dissection of frozen corpses into the technique of anatomy. Among his numerous works are the following: *Die Doppelbildungen und angeborenen Geschwülste der Kreuzbein- und Kreuzbindergegend* (1862); *Topographisch-anatomischer Atlas, nach Durchschnitten an gefrorenen Kadavern* (1872); *Die Lage des Uterus und Fötus am Ende der Schwangerschaft nach Durchschnitten an gefrorenen Kadavern* (1873); *Das Venensystem des menschlichen Körpers* (1884-88). In collaboration with His, he edited, after 1870, the *Archiv für Anatomie und Entwicklungsgeschichte*. He was also instrumental in securing the publication of the musical works of Frederick the Great.

BRAUNE, THEODOR WILHELM (1850-). A German philologist, born in Grossschönig, Saxony. He graduated at the University of Leipzig and afterward served as professor of the German language and literature at the universities of Leipzig (1877), Giessen (1880), and Heidelberg (1888). His published works include: *Beiträge zur Geschichte der deutschen Sprache und Literatur* (1874-91); *Neudrucke deutscher Literaturwerke des 16ten und 17ten*

Jahrhunderts (1876), *Althochdeutsches Lesebuch* (1875, 6th ed, 1907), *Gothische Grammatik* (1880, 7th ed, 1909, Eng trans, 1883, from 2d ed.), *Althochdeutsche Grammatik* (1886, 4th ed, 1910) *Der Gang des Menschen* (Leipzig, 1898-1903), *Ueber die Einnahme der deutschen Aussprache* (Heidelberg, 1904), *Die Fabeln des Brucius Alferus* (Halle, 1892)

BRAUNITE, brou'it, a siliceous sesquioxide of manganese, which occurs associated with manganese deposits notably at Ilmenau, Thuringia, and Ilfeld in the Harz. It occurs in tetragonal, pyramidal crystals, black or steel gray in color, and with submetallic lustre

BRAUNSBURG, brouns'bérk (earlier *Brunsbérg*) A town of East Prussia, in the administrative district of Königsberg, about 35 miles southwest of the city of that name (Map Prussia, H 1) It is situated on the Passarge, 5 miles from its junction with the Frisches Haff. It contains a Catholic seminary, a gymnasium, and the Lyceum Hosianum founded by Bishop Hosius in 1568. The industries consist of a large number of manufactories, the principal articles being soap, leather, yeast, and felt ware, and a trade in grain and flax. It has regular steamship communication with Pillau and Königsberg. The town was founded about 1251 by the Teutonic Knights. It has belonged to Prussia since 1772, the date of the first partition of Poland. Pop. 1900, 12,497, 1910, 13,601

BRAURONTA A festival in honor of Artemis, celebrated at intervals of four years at Brauron, a village near Marathon, now called Vraoua. At the festival Attic girls between 5 and 10 years of age were consecrated at the sanctuary of Artemis. A part of the rite consisted in the imitation of the actions of bears by the girls. According to tradition, this rite originated in a plague sent upon the Athenians by Artemis in punishment for the killing of a tame bear which had torn a little girl in pieces because the girl had irritated it. To propitiate the goddess, the rite was instituted, and all Attic women were obliged to take part in it before they were permitted to marry. To Brauron Orestes (qv) and Iphigenia (qv) were supposed to have brought from Tauris the statue of the Tauric Artemis

BRAUWER, brou'ér, ADRIEN See BROWER

BRAVA'S, brá'vaz, KNIGHT. In Ariosto's poem, a name for Orlando Furioso, who was Marquis of Brava

BRAVI, brá'vé (It pl of *bravo*, brave). Originally the retainers of a noble house and the champions of its quarrels. Later the bravi were wont to offer their services to any one for money. The internal history of Italy for many centuries is replete with the actions of these men, who in time became nothing more than hired bandits and assassins. In a more favorable sense *bravo*, the singular of *bravi*, was applied to the dueling, love-making, sonnet-writing, and stabbing type of gentleman that flourished amid the lax morality of the Renaissance

BRAVO-MURILLO, brá'vó-mú-ré'lyé, JUAN GONZÁLEZ (1803-73) A Spanish statesman. He studied theology for a time, was afterward a lawyer in Seville, and then became the editor of the first law journal in Spain, the *Boletín de Jurisprudencia*, founded by him and Pacheco in Madrid in 1835. With others he also established later the conservative papers *El Porvenir* and *El Piloto*. In 1837, and again in 1839, he was a leading member of the Cortes, but was pro-

scribed after the Revolution of 1840 and took refuge in France. He returned in 1843 on the downfall of Espartero, was a member of the Ministry in 1847, and on the resignation of Narváez in 1851 formed a new cabinet, but resigned as Prime Minister in 1852, after having pursued a reactionary policy. The Revolution of 1854 caused him to leave Spain again, but he was recalled by Narváez in 1856 and afterward was intusured with important diplomatic missions. In 1868 he was again of the cabinet, but within the year followed the Queen when she was forced to flee to Bayonne

BRAVURA, bra-voo'ra (It bravery, spirit, dash) A term which, applied to a musical composition, means that the music is written in a dashing, brilliant style, full of ornamentation and colorature that put to a severe test the abilities of the performer. Such compositions are often written to display the power, volume, or flexibility of a voice or the digital facility, power, and endurance of an instrumental performer. In the early part of the nineteenth century the excessive liberties taken by singers in improvising trills and runs to exhibit their voices induced Rossini to write out the bravura passages in his works so as to insure them against disfigurement by tasteless singers. It was owing to these latter that bravura fell into discredit. That it can be united with true artistic merit, the works of Mozart, Beethoven, Weber, Mendelssohn, Chopin, and others give abundant proof

BRAWE, bra'vé, JOACHIM WILHELM, BARON VON (1738-58) A German dramatist, born in Weissenfels (Saxony). He studied at the University of Leipzig, where he associated with Lessing, Weiss, and E. von Kleist, and was appointed to the government board in Merseburg, but died before he had taken office. His *Der Freigeist*, a tragedy, was influenced by Lessing's *Miss Sarah Sampson*. His *Brutus*, with Lessing's *Kleopatra*, the first German dramas to be written in unrhymed iambic pentameter, gave evidence of unusual poetic talent. They were edited by Ramler and Lessing (Berlin, 1767). Consult Saer, "Brawe, der Schuler Lessings," in Ten Brink and Scherer, *Quellen und Forschungen zur Sprach und Kulturgeschichte der germanischen Völker*, vol. xxx (Strassburg, 1878)

BRAWLING (OE *braulan*, to quarrel, boast, biallan, to cry, make noise, Ger *bräulen*, Fr *brailleur*, to cry, shout) As a criminal offense, the creating of a disturbance in a consecrated building or inclosure. This was considered a heinous offense both by the ecclesiastical and the common law of England, "as being a very great indignity to the Divine Majesty, to whose worship and service such places were dedicated." By the Brawling Act of 1860 (23 and 24 Vict c 32, § 2), any person guilty of riotous, violent, or indecent behavior in a church, chapel, churchyard, or burial ground, is liable to a fine of not more than five pounds, or to imprisonment for not more than two months. In the United States similar acts are punishable, generally, as affrays or breaches of the peace. See AFFRAY, BREACH, and the authorities referred to under CRIMINAL LAW

BRAXTON, CASTER (1736-97) An American patriot, one of the signers of the Declaration of Independence. He was born in Newington, Va., of wealthy parents, and was educated at William and Mary College. From 1761 to

1771 he was a member of the House of Burgesses, and, as such, took an active part in all the disputes with the royal governors, and in 1765 strongly advocated the adoption of Patrick Henry's Stamp Act resolutions. He was a member, also, of the conventions which met in Williamsburg (August, 1774) and in Richmond (July, 1775), and served as a delegate to the Continental Congress from December, 1775, to Aug. 11, 1776, during which time (on August 2) he signed the Declaration of Independence. Afterward he was frequently elected to the House of Delegates and was twice a member of the Council of State. He was a representative of the "aristocratic party" in Virginia, and by his views with regard to the organization of a new government—notably those in his *Address to the Convention of Virginia on the Subject of Government* (1776)—gave considerable offense to the more radical members of the Patriot Party. Consult Sanderson, *Biography of the Signers of the Declaration of Independence* (5 vols., Philadelphia, 1829).

BRAX'Y, BRAK'SY, BRAX'ES, BRAX'TT, BRACKS, or BRAASOT (Scotch, origin unknown). Terms synonymously used to designate several different diseases in domestic animals. They are perhaps most correctly applied to a disease of sheep, which has also been called "the sickness" in some parts of Scotland, "Braasot" in Norway, and "Maladie subite du mouton" in France. This disease appears as an epizootic and is due to the action of a pathogenic organism, *Bacillus gastrimycolosis ovis*, which causes a severe inflammation, especially of the abomasum and duodenum. The braxy bacterium rapidly loses its virulence in cultures and does not develop in the presence of oxygen. Ingestion appears to be the common natural method of infection. The germs exist in the soil of infested localities and are taken into the stomach along with the fodder. The disease appears in the autumn, becomes most prevalent in winter, and usually disappears in spring, being but rarely seen in summer. Sheep from a few months (weaned lambs) up to two years of age are most susceptible to its attacks. The animal in full health suddenly ceases to eat, has a staring look, is peculiarly excitable, and separates itself from the flock. The head is lifted high, the breathing becomes labored, the countenance appears anxious, and the animal loses the power of its limbs. It totters, falls over, is seized with convulsions, and dies within five or six hours, and often within an hour from the first symptom of the disease. Tumors are frequently developed on the neck and shoulders. If the sheep's throat is cut before it dies, the absence of any peculiar appearances within the body is very remarkable; the flesh appears of a dark-red color, and the veins are charged with dark blood, but, on the whole, the body of the sheep looks so well that the mountain shepherd cuts it up to make "braxy mutton," which has a fetid odor. If the sheep is allowed to die of itself, the body soon swells, putrefies, and is rendered useless. It is doubtful whether the meat should ever be eaten. A method of vaccination in which peritoneal fluid from braxy cases is used gives good results, the mortality from braxy following its use never exceeding 1 per cent, even in the most severely affected districts. Shelter during severe winter weather is insisted on by shepherds as essential to prevent the malady. The prognosis is very un-

favorable. In Ireland the disease is invariably fatal.

BRAY. A maritime town of Ireland, situated partly in the county of Dublin, partly in that of Wicklow, at the mouth of the Bray, 13 miles southeast of Dublin (Map: Ireland, E 3). From a small fishing village Bray has developed into a popular watering place, owing to the beauty of its situation. It has a long esplanade, good hotels, Turkish baths, electric lighting, etc., and is sometimes called the "Irish Brighton." Pop., 1901, 7424.

BRAY, MRS. ANNA ELIZA KEMPE (STOTHARD) (1790-1883). An English novelist, born in London. She published a considerable number of works of historical fiction and volumes of travel, including *The Borders of the Tamar and the Tavy* (1836), *Trelawny of Trelawne* (1837), and *A Peep at the Pixies* (1854). After a long silence she issued in 1870 three French historical novels, *The Good St. Louis and his Times*, *The Revolt of the Protestants of the Cevennes*, and *Joan of Arc*. The fiction was collected in a 12-volume edition in 1884 and in the same year appeared her *Autobiography*, ed. by Kempe (London, 1884).

BRAY, FRANK CHAPIN (1866-). An American editor and educator, born in Salineville, Ohio. He was a printer's apprentice, worked his way through college as a printer and reporter, graduated at Wesleyan University in 1890, became city editor of the Middletown (Conn.) *Herald* in 1891, and was managing editor of the *Morning Despatch* of Erie, Pa., in 1892-04. For six years he edited a department called "Topics of the Day" in the *Literary Digest*, and in 1899 became editor of *The Chautauquan*, the organ of the Chautauqua Literary and Scientific Circle. In 1902 he was made editor in chief and in 1906 editor manager of the Chautauqua Press, which publishes the magazine just mentioned and the study courses of the Chautauqua circle. He wrote *A Reading Journey through Chautauqua* (1905).

BRAY, bñ, OTTO CAMILLUS HUGO, COUNT OF BRAY-STEINBURG (1807-99). A Bavarian statesman. He was born in Berlin and after completing his studies in that city entered the diplomatic service of Bavaria. At first Counselor of Legation at St. Petersburg and at Paris, he later successively became Ambassador to Greece and Russia, Minister of Foreign Affairs (1846 and 1848), again Ambassador to Russia and Ambassador to Austria. In 1870 he succeeded Prince Hohenlohe as Minister of Foreign Affairs, in which capacity he negotiated the union between Prussia and Bavaria in 1870 and the admission of the latter into the German Empire. He retired from political life in 1896.

BRAY, SIR REGINALD (died 1503). An English statesman and architect, a favorite of Henry VII., from whom he received many royal benefits. At the coronation of Henry VII. Bray was made Knight of the Bath and later he became a Knight of the Garter. He was awarded a grant of the constableness of Oakham Castle in Rutland, was appointed to serve with Lord Fitzwalter as chief justice of all forests south of Trent, became High Treasurer and Chancellor of the Duchy of Lancaster, and served a term in Parliament. In October, 1494, he was appointed high steward of the University of Oxford and is believed to have held the same office in the University of Cambridge. For his bravery at the battle of Blackheath, June, 1497, he was made

a knight banneret and was given a large estate. One of the leading architects of his time, he designed St Mary's Tower at Taunton, and the decorative work of the interior of St George's Chapel at Windsor. His masterwork is the chapel of Henry VII at the east end of Westminster Abbey, if indeed this attribution be correct. The probability is that it was designed by Robert Vertue, and erected by William Bolton as Master of Works, and that Bray's share in its design was subordinate to Vertue's and confined to the decorative detail.

BRAY, THOMAS (1656-1730). An English prelate and philanthropist, born at Marton (Shropshire). He graduated at Oxford in 1678 and was appointed to the vicarage of Over-Whitacre and the rectory of Sheldon. In 1698 he founded the Society for Promoting Christian Knowledge and in 1700 organized the Anglican church in Maryland. He obtained the passage by the Provincial Assembly of the Act of Religion, which in 1701 received royal sanction. A charter was acquired by him in 1701 for the Society for the Propagation of the Gospel in Foreign Parts. In 1706 he became rector of St Botolph's, Aldgate. He projected and extended a system of parochial lending libraries to be established in every deanery and in 1723 founded for the continuance of his work the society known as the "Associates of Dr Bray," which still exists and publishes annual reports. He was also interested in other benevolent works. He published *Upon the Preliminary Questions and Answers* (1696, vol. 1 of *Lectures upon the Church Catechism*, incomplete), *An Essay Toward Promoting All Necessary and Useful Knowledge* (1697), *Apostolick Charity* (1698), *Directorium Missionarium* (1726). A selection of his writings relating to Maryland, with a memoir by Rawlinson, was published in 1901 by the Maryland Historical Society.

BRAYMAN, MASON (1813-95). An American lawyer and soldier, born in Buffalo, N. Y. He was early apprenticed to a printer, was editor of the *Buffalo Bulletin* in 1834-35, and was admitted to the bar in 1836. After 1837 he lived successively at Monroe, Mich., Louisville, Ky. (where he edited the *Advertiser*), and Springfield, Ill. In 1843, as a special commissioner for the State of Illinois, he was charged with adjusting the difficulties arising from the settling of the Mormons at Nauvoo (qv) and was also instrumental in securing the removal of the Mormons from the State in 1844. He revised the Illinois Statutes under authority of the Legislature in 1844-45 and from 1851 to 1855 acted as attorney for the Illinois Central Railroad. Having entered the Federal army as major of volunteers on the outbreak of the Civil War in 1861, he was a chief of staff and assistant adjutant general to General McClelland in 1862, was raised to the rank of brigadier general of volunteers in September, 1862, repelled Van Dorn's attack on Bolivar, Tenn., was in command at Natchez in 1864-65, and at the close of the war was brevetted major general. He subsequently took an active interest in the organization and management of railroads, was editor of the *Illinois State Journal* in 1872-73, and served as Territorial Governor of Idaho from 1876 to 1881.

BRAZEN AGE, THE. One of a group of four plays by Thomas Heywood. The group, known as *The Four Ages*, consists of *The Golden Age* (1611), *The Silver Age* (1612), *The Brazen*

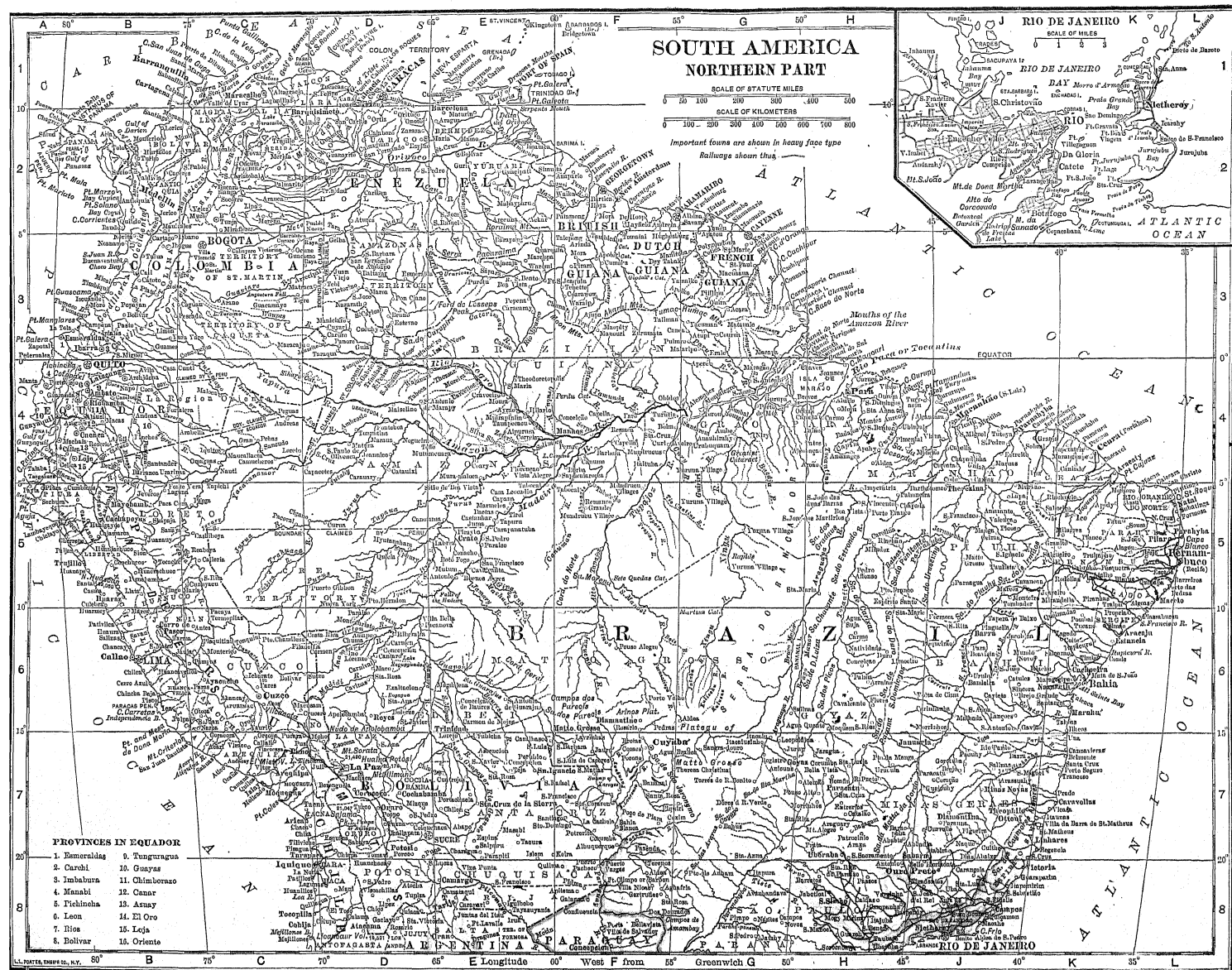
Age (1613), *The Iron Age* (printed 1632). The plays deal with the most famous of the Greek myths and are largely founded on Ovid's *Metamorphoses*. The author's treatment of the subject does not rise entirely above the bulesque.

BRAZEN SEA. A large vessel of copper, 5 cubits high and 30 (or, according to the Septuagint, 33) in circumference, 10 cubits in diameter, placed by Solomon in the priest's court for the use of servitors. It rested on 12 oxen, 3 placed on each side, with heads facing outward. The basin is said to have held about 2000 measures (baths) of water (1 Kings vii 23-26), according to 2 Chron iv 6, it was used by the priests for ablutions prior to approaching the altar, but it seems likely that it originally had a symbolical significance rather than a practical use. In the Babylonian religion, as in Semitic cults in general, the bull is a mythological emblem. Aliaz moved the brazen sea from the base of oxen and placed it on a stone base (2 Kings xvi 17). The sea was finally broken by the Chaldeans and the copper carried to Babylon (2 Kings xxv 18).

BRAZEN SERPENT. Moses is said to have made a serpent of brass and erected it on a staff before the people, so that whosoever looked upon it should be healed (Num xxi 9). In the time of Hezekiah the brazen serpent was looked upon as a sort of divinity and incense was burned to it. In his reform it was broken to pieces together with other insignia of foreign worship (2 Kings xviii 4). Many scholars regard the story in Num xxi 9 as an account of the origin of this *Nehushtan*, or 'brazen serpent'. Among the Egyptians the uræus serpent was regarded as especially sacred and adorned the entrances to their temples. In the Assyrian and Babylonian sanctuaries serpent images stood as guardians at the doors. The serpent was also looked upon by the Phœnicians as a god of healing.

BRAZIL', *Portug. pron* brá-zil' (from the color of its dyewoods, *brasa*, Portug. *brasa*, a live coal), UNITED STATES OF. The largest country in South America, and one of the most extensive political subdivisions of the world, including the central and eastern portions of the continent. It is embraced, approximately, between lat 5° N and 34° S and between long 35° and 74° W, its greatest length from north to south is about 2660 miles and from east to west 2700 miles, the total area is estimated at 3,301,350 square miles. Its limits on the northeast and southeast are the Atlantic Ocean, while the remaining portion of the northern boundary is formed by the Guianas, Venezuela, and Colombia, on the west, southwest, and south it touches Peru, Bolivia, Paraguay, Argentina, and Uruguay. It lies entirely to the east of the Great Andean system.

Northern and western Brazil is occupied by the basin of the Amazon, and while the political boundary extends to the mountains and highlands on the north, yet almost the whole of this section is a great plain, the so-called *selvas*, in which the altitude does not exceed 1000 feet and the greater part is below 500 feet. The southern and eastern part of Brazil is plateau-like in character, rising above 2000 feet in altitude, and much of it above 4000 feet, it is broken by the valleys of the source streams of the Paraná and of the upper Uruguay in the south, of the Tocantins and Araguaia in the north, and the São Francisco in the central and



eastern parts. This tableland, which is best designated the Brazilian Highlands, is geologically the oldest part of South America. It was elevated bodily, with little, if any, distortion, and the present configuration of the surface is due to differential erosion, by which the harder and more resistant rocks have been preserved in the mountain ranges. It results from this mode of origin that the ranges are irregular in distribution and trend. They may, however, be grouped in three systems, the most important of which is the Serra do Mar, which forms the southeastern slope of the plateau to the narrow strip of coast along the Atlantic. In this system, west of Rio de Janeiro, is the highest peak in Brazil, Itatiaia, 8900 feet in height. The system bears many different names in different parts, as Serra Geral, Serra da Mantiqueira, and Serra dos Amores. Connecting with this range near Rio de Janeiro and stretching northward between the São Francisco and the streams flowing directly to the coast, is the Serra Central, while a third range trends northwestward, separating the heads of the São Francisco and Tocantins from those of the Parana. Minor ranges and ridges separate the tributaries of these rivers from one another. West of this great plateau of eastern Brazil a highland stretches across to the Andes, dividing the waters of the Amazon from those flowing southward to the Rio de la Plata. On the north, the Tumuchumac and Acaí mountains separate Brazil from the Guianas, and the Serra Pacaraima separates it from Venezuela. The Atlantic coast line has a length of about 4000 miles. North of Cape St. Roque it is comparatively low, and the slope towards the sea is gradual, but south of the cape the coast line gradually becomes more elevated, the slope of the sea is steeper, and at the extreme south very abrupt. The north coast is but little broken and thus offers but few fine harbors and not many islands, but at the south good harbors are not wanting.

Hydrography. The rivers of Brazil possess a degree of importance greater than most of the other rivers of the world, since they form the chief, and in some cases the only, highways of travel and commerce through a region of great natural resources. Owing to the copious rainfall and the mild climate, navigation of most of them is possible throughout the year, in spite of their great fluctuations in volume from the wet to the dry season. More than two-thirds of Brazil, 2,235,000 square miles, is drained by the Amazon and Tocantins, about a fourth by the Paraguay-Paraná system, while the remainder is drained by the São Francisco and smaller streams. The Amazon with its great branches, the Negro, Japurá, and Içá on the north, the Javary, Jurua, Purus, Madeira, Tapajoz, and Xingó on the south, with the Tocantins, which joins it in its delta, affords a system of internal navigation comparable only to that of the Mississippi. The length of the main river from the Peruvian boundary to its mouth is about 2500 miles, practically all of which is navigable. The total length of the Amazon and its main branches within Brazil is estimated at 10,000 miles, of which 13,000 miles are navigable. The navigable stretch is much longer on the upper than on the lower branches, as the latter head in the plateaus of Guiana and southeast Brazil, and are interrupted by rapids and falls, especially where leaving the plateaus. Such is the

case also with the São Francisco, where navigation is interrupted by the falls of Paulo Afonso, only 60 miles above the river's mouth. The Negro, a large northern branch of the Amazon, is connected through the Casiquiare with the Orinoco. See also AMAZON, TOCANTINS, etc.

Unexplored Regions. The largest unexplored areas of South America are in Brazil among the tropical forests of the Amazon basin. The greater portion of the basin, and especially the southern part, is covered by virgin forest, with only here and there a campo or plain of comparatively small extent. The dense undergrowth renders these forests almost impenetrable except along the navigable streams. Until recently explorers have not traveled inland away from the banks of the great north and south affluents of the Amazon, thus most of the forest was unknown except along the water highways. Two inducements—the quest for rubber and ethnological investigation—have, since 1900, resulted in many journeys along affluents of the Amazon tributaries and the penetration of the country on either side. The unexplored areas, though still embracing hundreds of thousands of square miles, are being reduced every year by the invasion of rubber hunters, including men of scientific training, such as Kahler, Ule, and others, who are spending years in studying the distribution and extent of the rubber resources. This work is stimulated by the fact that there are no rubber forests on the Amazon as we should speak of oak or pine forests, but rubber trees are scattered among other kinds of timber forming only a small percentage of the trees. An area must be well explored in order to ascertain its rubber-yielding value. Ethnological research has in recent years especially contributed to geographical discovery in the northern part of the Amazon basin. The four journeys of Dr. Koch-Grünberg (1903-05) for the study of Indian tribes resulted, for example, in the mapping of the unknown headwaters of the Rio Negro. The largest unknown areas are now in the southern part of the basin between the Tocantins and the Madeira rivers.

Climate. Brazil lies almost entirely within the tropics, the region of the trade winds, and is dependent upon the latter for its rainfall and upon the Atlantic as the source of moisture. Wet and dry seasons alternate, as the movement of the trades follows the sun from north to south, the effects being modified by the direction of the coasts and the relief of the surface. In the greater part of the country the climate is remarkably constant, with a fairly uniform temperature throughout the year and a heavy rainfall. In the great Amazon valley, which is low and moist, densely forested, and subjected at all times to the sweep of the trades, the temperature averages about 90°. The annual range is about 40°. Moist winds afford a copious rainfall, ranging commonly from 75 to 100 inches and increasing to much greater amounts at the foothills of the Andes, where the air currents are forced upward into colder regions. It is believed that in some parts of the valley of the Amazon the rainfall is fully 300-400 inches. While the wet and dry seasons are not strongly marked, most of the rain falls between January and June. On the coast of the plateau region of southeastern Brazil there is a greater range of temperature with the seasons, and a more strongly marked seasonal rainfall, the greater part of the annual precipitation coming

in the summer, when the sun is south of the equator, and the trades have moved south with it. In the interior of this plateau region the seasonal distribution of the rain is still found, but the amount is much less than on the coast, indeed, in some regions, as between the São Francisco and the Paraná, the rainfall is deficient in amount.

Flora. The flora of Brazil may be divided roughly into three zones—that of the lowlands of the Amazon basin, that of the southeastern plateau, and that of the broad divide separating tributaries of the Amazon from those of the Paraná-Paraguay system. Vegetation on the lowlands of the Amazon is of the most luxuriant character. Along the coast mangroves, mangoes, coconuts, dwarf palms, and the Brazilwood are noticeable. Most of the Amazon basin is a vast forest stretching from the foot of the Andes to the sea, with a great variety of palms and hard woods and a number of rubber trees including 12 varieties of *Hevea*. *Hevea brasiliensis* yields the famous Pará rubber. Among the indigenous or widely cultivated fruits are the pineapple, fig, custard apple, mango, banana, guava, grape, and orange. European grapes, olives, and watermelons of fine flavor are cultivated. On the southeast coast, within the tropics, where the rainfall is abundant, there is a similar profusion of vegetation, succeeded southward by plants of a more temperate climate. Inland, as the rainfall diminishes, upon the plateau, the vegetation becomes less abundant and changes in character to open forests of smaller trees, with palms, ferns, and cacti. This is the caatinga country.

Fauna. The animal life of Brazil is extremely varied and differs in many important respects from that of the northern continent and the Old World. Of larger animals, there are the puma, jaguar, ocelot, and several members of the dog family. The capibara, peccaries, and tapirs are abundant, also ant-eaters, sloths, opossums, and armadillos. Deer are plentiful in the more open country of the south, and monkeys of many species abound in the silvas. There is a great variety of birds, which are characterized by the brilliancy of their plumage and their dissimilarity to the birds of other countries. Snakes are abundant, several species, including the rattlesnake and jararaca, being venomous; the boas reach an enormous size. The inland waters swarm with fish and turtles, and certain cetaceans ascend far up the Amazon.

Geology. The southeast table-land is in the main composed of crystalline rocks, including granite, gneiss, and schist of Archean age. These rocks also extend westward from the states of Minas Geraes and São Paulo into the interior of Matto Grosso, forming the divide between the Amazon and the Paraná-Paraguay systems. A second Archean area is found in the highlands bordering the Guianas, near the northern boundary, and there are smaller detached areas in the middle portions of the Tocantins and Xingú valleys. Paleozoic strata occupy the flanks of the Archean, while Cretaceous and Triassic beds cover a large portion of the plain of central Brazil. The Tertiary and Quaternary formations are developed along the Amazon valley and the coastal regions. The Archean rocks are the source of the famous diamond and gold deposits of Minas Geraes, which have been very productive in the past and are still the basis of an important mining indus-

try. The manganese ore deposits in the same state are perhaps the most extensive in the world.

Mineral Resources. Brazil is one of the richest mineral-bearing countries in the world; but scarcity of population and capital, together with restrictive mining legislation, are in the way of an active development of the country's possibilities. It is estimated that no less than \$800,000,000 worth of gold had been exported from Brazil prior to 1820, one-half of which came from the state of Minas Geraes, which is to Brazil more than California and Pennsylvania together are to the United States. Formerly there were extensive surface diggings of gold and diamonds, but they have been mostly exhausted. At present gold mining is carried on to a limited extent in Minas Geraes, mostly with the aid of British capital. The production reached \$2,500,000 in 1900, \$2,043,500 in 1904, and \$1,900,000 in 1910. Minas and Bahia yield about 40,000 carats of diamonds a year; the exports in 1911 were valued at only \$19,918 milreis paper (about \$100,000). The production since 1723 is valued at \$100,000,000.

Iron, lead, copper, zinc, manganese, and quicksilver also abound, but the mining of these metals is impeded by lack of cheap fuel and labor. Several attempts were made in recent years, not only to mine iron and other ores, but to smelt them and even convert them into the finer manufactured products; but most of the smelting works, blast furnaces, and rolling mills had to shut down on account of the difficulties mentioned. Some bituminous coal is mined in Rio Grande do Sul and Santa Catharina, and lignite in some of the other states; but although the coal beds of Brazil extend from São Paulo in the north down to Rio Grande do Sul, being quite thick in the south, they are of an inferior quality, and the coal requires considerable washing to become useful. Marble and other valuable building stones abound. Rock salt, phosphate of lime, kaolin, and hot mineral springs also occur.

Agriculture. Only a small portion of the surface of Brazil suited to agriculture is under cultivation. This is in great measure due to the fact that Brazil is a country of relatively recent settlement. Even so, the agricultural population is small, as a rule, and the farms and plantations are tilled in a very primitive manner. In many parts the gathering of forest products is preferred. The most profitable crops—coffee and sugar—naturally have the largest areas devoted to them, tobacco and cotton coming next. The coffee plant is most extensively grown in the states of Rio de Janeiro, Minas Geraes, and São Paulo. The industry has suffered in recent years from overproduction. The annual yield increased from 4,600,000 bags (of 132 pounds each) in 1890 to 11,000,000 in 1900, and 12,000,000 bags in 1912. Vigorous efforts have been made by the federal government and by the government of São Paulo to maintain and advance the price of coffee,—by the imposition of an additional tax on exports over a certain amount, by the purchase of immense quantities of coffee, which were thus removed from competition in the world's markets, and by a propaganda to encourage the world's consumption. Nearly all the coffee used in the United States comes from Brazil. The Atlantic states yield the sugar supply, especially Bahia and Pernambuco. Cotton of excellent quality is produced in every state. The tobacco is inferior to that of the West Indies. The

greater part of the tobacco exported is grown in Bahia. Maize and rice are among the leading products of Minas Geraes and São Paulo, but not enough is raised for home consumption. The small grains do not flourish. Among the more common food products are sweet potatoes, yams, beans, and the farina prepared from the root of the manioc or cassava (qv). Cacao is grown in northeastern Brazil, and the leaves of the holly, or ilex, which yields the maté (qv), or Paraguay tea, are gathered in the extreme southern States, especially in Paraná. Pumpkins, squashes, cabbages, okra, tomatoes, onions, cucumbers, and other vegetables are raised. The raising of cattle and the breeding of horses give occupation to many in the southern state of Rio Grande do Sul. Although Brazil has many kinds of durable woods, timber for making railroad cars is imported from India. Large quantities of salt fish are brought from the United States, when Brazil might easily supply her needs by improving her own fisheries.

Manufactures. Long occupying a subordinate place as compared with agriculture, mining, and the collecting of forest products, manufactures are becoming more important. They are taking the natural course of development, those industries thriving most which are devoted to the manufacture of goods from the natural agricultural and mining products of the country. Thus the textile industry is the most important, cotton spinning and weaving taking first rank, followed by woolen manufactures. In 1910 there were 194 cotton mills with 761,816 spindles and 27,958 looms, employing about 40,000 operatives and producing annually over 20,000,000 yards of cloth. Most of the mills are in Rio de Janeiro, Minas Geraes, and São Paulo. The same is true of the location of the woolen mills, whose number, however, is small. Sugar refining is the next industry in importance. In the states of Bahia and Pernambuco and elsewhere the refining of sugar is extensively carried on by the diffusion process, and in remote districts by somewhat primitive methods. Several kinds of rum are distilled in the sugar districts, and cigar making is an important industry. The smelting of metals, the manufacture of steam engines and agricultural tools, the tanning of leather and working of hides, and the manufacture of salt, straw hats, soap, and candles employ many hands, and within recent years the list of artificial products has been lengthened by the addition of paper, calicoes, powder and dynamite, glass, wines, beer, cottonseed oil, castor oil, wax matches, and sulphuric acid. Shipbuilding is carried on in several ports.

Transportation and Communication. The first railway in Brazil was opened to traffic in 1851. It was only 9 miles long, and connected Porto de Mauá, on Rio de Janeiro Bay, with Ruiz de Serra. The line was a purely private undertaking. In 1855 the first private line built under a government guarantee was constructed, the same year having witnessed the opening of the first government railway. Since then the government has taken an active part in railway development.

The two main railway systems radiate from Rio Grande do Sul and Rio de Janeiro, the latter extending especially into the state of São Paulo. These two systems have recently been connected, thereby allowing continuous communication by rail between Rio de Janeiro and Montevideo in Uruguay. A third railway

system has Bahia and Pernambuco as centres. The total length of railways has been as follows: 1860, 109 miles, 1870, 448, 1880, 2120, 1890, 5995, 1900, 9102, at the end of 1911, 13,848, and 2387 miles more under construction. The length of railway owned and operated by the government at the end of 1911 was approximately 2033 miles, leased by the government to companies, about 4750 miles, concessions to companies with interest guaranteed, about 1875 miles, concessions without guarantee of interest, about 1200 miles, state (as distinguished from federal) concessions, over 3950 miles. The total mileage in operation at the end of 1912 was 14,338. Telegraphs in 1909: lines, 36,109 miles, wire, 73,124, offices, 2070.

Shipping. As the railway system is very little developed, Brazil is chiefly dependent upon its coastal waters and rivers as highways for its domestic trade. The shipping trade is therefore unusually prominent, and as far as it relates to commerce between different parts of the republic, it is confined to vessels flying the Brazilian flag, as the government excludes all foreign vessels from the coasting and river trade. Brazil's merchant marine numbered, in 1911, 238 steamers and 290 sailing vessels. Nearly four-tenths of the total tonnage of vessels entering Brazilian ports is domestic shipping. In 1905 the number of vessels entered at all Brazilian ports was 17,072, with a total tonnage of 12,927,000, and the number of vessels cleared was 17,064, with a tonnage of 12,926,000. The chief port is Rio de Janeiro, the New York of Brazil, receiving two-fifths of Brazil's imports and shipping one-sixth of its exports. Other important centres of foreign commerce are Bahia, Pernambuco, Ceará, Paráhyba, in the north, and Santos, Paranaguá, Desterro, Porto Alegre, and Rio Grande do Sul, in the south. In 1867 the Amazon was opened to all nations. Twenty-three steamship lines are subsidized by the government, including two from Santos to Hamburg and Genoa. Of six lines between Brazil and the United States, four are British and one is German.

Commerce. Brazil has a larger foreign commerce than any other of the South American republics. In 1861 the exports from Brazil were valued at \$20,000,000, in 1890 they rose to \$140,000,000, and in 1912 reached the sum of \$363,535,000. The imports amounted to \$115,000,000 in 1890 and \$308,631,000 in 1912. Coffee is the staple article of commerce, meaning more to the exports and to the prosperity of Brazil than wheat does to the United States. It constitutes about 60 per cent of the total exports of the country in value. More than two-thirds of the coffee goes to the United States and the remainder to Europe. Rubber is next in importance, the United States taking nearly two-thirds of the supply. Then come cotton, cottonseed, hides, tobacco, cacao, maté (or Paraguay tea), dye and cabinet woods, etc.

The imports consist of all kinds of manufactured goods, cotton and woolen fabrics, machinery, ironware, coal, petroleum, and food stuffs, including flour, corn, jerked beef, pork, butter, lard, olive oil, wines, etc. In 1910 Great Britain controlled nearly one-fourth of the import trade, and the imports of the United States and Germany were together worth the same as the goods bought from Great Britain. The value of the imports from the leading countries was as follows in 1910: Great Britain, \$87,000,000, Germany, \$37,500,000, United States, \$30,250,-

000; France, \$22,270,000; Argentine, \$20,130,000; Belgium, \$10,650,000. Wheat flour and kerosene were the most important imports from the United States. Owing chiefly to the growing consumption of Para rubber in the United States as well as to the enormous demand for coffee, this country is gradually increasing its imports from Brazil and reached in the calendar year 1911 the high figure of \$123,000,000, while in 1909 it was still higher, having amounted to \$124,000,000. Considerable attention is now centred in the cultivation of rubber, and the success of these experiments will tend to augment the export trade.

Banking. The first bank established in Brazil, the Banco do Brasil, was founded in 1808. Modern banking dates from 1853, when the new Banco do Brasil was established with a capital of 33,000,000 milreis as a bank of issue. In 1890 three more banks of issue were established, the "regional" banks for north, central, and southern Brazil, with a total capital of 450,000,000 milreis, which was to be invested in 5 per cent government bonds. The banks were given other privileges, the most important of which was the exemption from import duties of all goods brought in by them. This secured for them an absolute commercial monopoly, which naturally led to great dissatisfaction among the business interests. In the meantime the issue of paper money by the three banks, the national bank, and a number of other banks, which had also been authorized to issue paper money, swelled the total amount of it in circulation to over 700,000,000 milreis, resulting in the usual disastrous consequences of inflation. More than 100,000,000 milreis of paper money was destroyed by the government in 1900. In 1905 the Bank of Brazil was reorganized.

Government. Brazil is a federal republic, comprising 20 states, a Federal District, and a territory (Acré) under a constitution adopted Feb. 24, 1891. The legislative power is vested in the president of the republic and a national Congress, consisting of a Senate and a Chamber of Deputies. The Senate is composed of three members from each state and from the Federal District, elected directly by the people for nine years, one-third of the number being renewed every three years. The Chamber of Deputies consists of 212 deputies elected by popular vote for three years upon the basis of one representative to every 70,000 of the population; no state, however, may have less than four representatives in the Chamber. The franchise is granted to all male citizens above the age of 21—with the exception of beggars, illiterates, soldiers actually serving, and members of religious associations. The executive authority is exercised by a president elected by direct popular vote for four years. He is assisted by a cabinet of seven ministers, who preside over the following departments; Foreign Affairs; Interior and Justice; Finance; War; Navy; Communications; and Agriculture, Commerce, and Industry. They are not responsible to Congress nor can they participate in the debates of either chamber, but they may appear in their official capacity before the congressional committees. The president possesses the veto power on legislation, but his veto may be overruled by a two-thirds vote of both chambers. The judicial power is vested in a federal supreme court consisting of 15 members appointed for life by the president with the approval of the Senate.

The constitution of Brazil was modeled after that of the United States, but differs from it in the complete autonomy which it leaves to the individual states, an autonomy amounting almost to decentralization. The states are governed by their own legislatures and governors and possess their own judicial systems. The federal government may intervene in local affairs only for the purpose of repelling foreign invasion or of preserving a republican form of government, or of enforcing the execution of federal laws. The public domains within the boundaries of any state are the possession of that state and under its control. A state may subdivide its territory at pleasure or consolidate with another state. Though the control of foreign affairs is delegated to the federal government, single states have frequently sent abroad representatives, endowed with all the powers of fully accredited plenipotentiaries, for the purpose of negotiating important commercial treaties and dispatching public business. In general there is a disposition on the part of the states to reduce the federal authority to a minimum.

The states are divided into municipalities whose affairs are controlled by a council and a prefect. The term "municipality" does not bear the usual meaning of a civic corporation, but denotes rather a district, or territorial division. In Rio de Janeiro the municipal head is appointed by the president of the republic.

Justice is administered in the first instance by justices of the peace (elected by the municipalities) in civil disputes and by the commissioner of police in criminal cases. Appeals lie to courts of second instance, which are composed of trained jurists, and from them to the courts of appeal, of which there is one in the capital of each state. The civil code is based upon Roman law.

For national coat of arms see Colored Plate accompanying HERALDRY; and for colors see Colored Plate of FLAGS.

Army. The reorganization of the army under the law of January, 1908, was completed in 1912, the peace strength of all arms totaling about 32,000. Military service is obligatory between the ages of 21 and 45—two years with the colors, seven in the reserve, seven in the territorial army, four in the national guard, and four in its reserve. Men in the reserve are called up for four weeks' annual training besides monthly rifle practice; those in the territorial army have an annual training of two to four weeks. The standing army includes: 15 regiments of infantry, each of 3 battalions; 12 battalions of rifles; 15 machine-gun companies; 9 regiments of cavalry, each of 4 squadrons, and 5 regiments, of 2 squadrons; 45 4-gun batteries; 5 6-gun howitzer batteries; 9 4-gun horse batteries; 6 4-gun mountain batteries; siege artillery; and engineering and transport troops. The country is divided into 13 military districts. The principal war arsenal is in Rio de Janeiro. The infantry rifle is a modified Mauser.

Navy. The navy includes: two dreadnoughts (*Minas Geraes* and *São Paulo*) of about 19,250 tons each, laid down in 1907; one old battleship (*Riachuelo*), 5700 tons; two armored coast guards (*Deodoro* and *Floriano*, laid down in 1898), aggregating 6320 tons; two scout cruisers (*Rio Grande* and *Bahia*, laid down in 1907), aggregating 6200 tons; two monitors, 940; one old

protected cruiser (*Barroso*), 3450, two second-class cruisers, 5840, three torpedo cruisers, 3090, 10 modern destroyers, 6500, in addition, various old torpedo boats and gunboats, transports, etc. A third dreadnought, the *Rio de Janeiro*, 27,500 tons, was laid down at Elswick in September, 1911, and launched in January, 1913, but in September of the latter year the Minister of Marine announced that the vessel was not in harmony with the organization of the fleet and that the government had decided to sell it. The principal naval arsenal is at Rio de Janeiro, here also are dry docks and, on an island in the bay, the naval school.

Weights and Measures. The metric system has been in vogue since 1862. The gold milreis is worth 54 6 cents, the paper milreis fluctuates between 31 and 35 cents.

Finance. Brazil, like some of the other South American republics, has suffered the results of an increasing expenditure over revenue and a depreciating currency. Reckless extravagance or unscrupulous handling of public funds by the parties in power, a too liberal use of the printing press in turning out paper money, and a general disregard of the simplest rules of public finance—all combined to create a financial condition verging on bankruptcy. The first example of extravagance beyond income and of shiftlessness in management of public finance was given early in the nineteenth century by King John VI, who fled with his court to Brazil after his overthrow in Portugal. In the course of time matters became somewhat improved under the monarchy, but the inauguration of the republic brought about a new regime of recklessness fanned by party feuds and political upheavals. It must also be added, in justice to the republic, that the enormous debts piled up as a result of the costly wars carried on under the monarchy left no small burden for the former to shoulder. However, the expenditures were allowed to increase beyond the revenue from year to year, and the deficits were covered by fresh loans. The providing of political offices for the members of the party in power, coupled with unreasonable additions to their salaries and excessive prices paid by the government for all kinds of supplies, was largely responsible for the great increase of expenditure, and, as the revenue meanwhile continued to fall behind, the national debt rapidly increased. In 1898 the government, unable to meet its obliga-

tions, negotiated with the London house of Rothschild a new debt, limited to £10,000,000. This loan is of great importance for the possibilities, embodied in its terms, of a permanent improvement in the financial conditions of Brazil. According to these conditions the government was to retire an amount of paper money equal to the new debt. A new sinking fund for the ultimate retirement of the bonded debt was provided for. This fund, to be begun in 1911, is to be formed from yearly deposits each equal to one-half per cent of the existing debt. The effect of the new provisions was soon apparent. The total amount of paper money in circulation, which had swollen from 186,000,000 milreis in 1889 to 702,000,000 in 1897, was reduced to about 674,400,000 in 1904 and to 612,510,626 at the end of 1911. The budget for 1912 showed estimated revenue of 92,195,610 milreis gold and 512,627,500 paper and estimated expenditure of 59,248,045 gold and 449,952,452 paper. Public debt, Dec. 31, 1911, foreign, £82,003,120 and 300,000,000 francs, internal, 620,525,600 milreis, floating, 256,546,647 milreis, paper money, 612,519,626.

The chief sources of revenue under the new regime are import duties, which furnish one-half the total revenue, next in importance are excise, railways, stamps, posts, and telegraphs.

Population. Previous to 1872, when the first full census was taken, the estimates were based upon the official returns of 1817 and 1818. In 1850 the population was supposed to be about 7,000,000 and, in 1860, 8,000,000. In 1912 the estimated population was 25,000,000.

The population of Brazil is the largest of any country in the Western Hemisphere except the United States. The average density of 62 persons to the square mile is, however, far behind that of some of the Spanish-American countries, Mexico having 208, Chile, 130, and Colombia, 104. As in nearly all countries having a considerable immigration, the number of males is in excess of females, the 1900 census showed 8,825,636 males, 8,492,920 females, total, 17,318,556. Less than one-half of the people were whites, one-third were half-breeds, one-seventh negroes, and less than one-tenth Indians, nearly one-half of whom were practically savages. A considerable proportion of the so-called whites are people of mixed Caucasian, Indian, and negro origin. As shown by the table, several of the larger states of Brazil are

STATE	Area in square miles	Population			Density of population
		1890	1900	1908	
Acre Territory	73,750			65,000	0.8
Alagoas	10,230	511,440	640,273	786,600	76.7
Amazonas	714,300	147,915	249,756	379,000	0.5
Bahia	216,230	1,910,802	2,117,056	2,287,000	10.5
Ceará	61,780	805,687	859,127	886,000	14.3
Espirito Santo	17,000	135,907	209,783	207,000	17.5
Federal District	470	522,051	740,749	878,000	1825.5
Goyas	206,420	227,572	255,284	280,000	1.1
Maranhão	131,280	430,854	490,308	502,000	4.3
Mato Grosso	579,500	92,827	118,025	142,000	0.3
Minas Geraes	231,670	3,184,090	3,594,471	3,900,000	17.1
Pará	482,000	328,455	445,356	508,000	1.2
Parahyba	21,620	457,232	400,784	520,000	24.1
Paraná	67,670	240,491	327,135	406,000	6.0
Pernambuco	38,000	1,080,224	1,178,150	1,310,000	36.5
Piauí	92,670	267,600	334,328	400,000	4.3
Rio de Janeiro	16,800	876,884	920,035	968,000	57.6
Rio Grande do Norte	20,080	203,273	274,317	279,000	13.9
Rio Grande do Sul	109,670	897,455	1,149,070	1,400,000	12.8
Santa Catharina	43,630	283,769	320,289	353,000	8.1
São Paulo	96,630	1,384,753	2,279,608	3,397,000	35.2
Sergipe	9,650	310,926	355,264	413,000	42.8
Total	3,301,350	14,333,915	17,371,069	20,515,000	6.2

almost devoid of population, the bulk of the people living along the coast.

Immigration. As is the case with all new countries Brazil needed immigrants to develop her resources. Nothing is more natural, therefore, than that the Brazilian government should try to attract Europeans by offering the immigrants abundant land for colonization purposes. The immigration laws of Brazil, like those of Argentina, were drafted solely with that end in view, but have not been carried out with the persistency or ability which has marked the policy of the Argentinians and therefore have not been crowned with the same degree of success. From the earliest time most of the immigrants came from Spain, Portugal, and Italy. The German immigration which began in 1825 soon reached considerable proportions under the fostering care of the Hamburg "Kolonisationsverein," so that by the end of the seventies there were from 150,000 to 200,000 Germans in the country. These people were attracted to the southern states—Rio Grande do Sul, Santa Catharina, and São Paulo—where the government offered them, in addition to free transportation from Europe to the place of destination, from 60 to 125 acres of land per family and furnished provisions, implements, and seeds until the time of the first crop. The land was not given free to the settlers, but sold at the low price of from \$1 to \$2 per acre, to be paid to the government in from 7 to 10 years. The object in settling the southern states was not only to increase the population in the most thinly settled parts of the country, but to create a European population capable of raising European agricultural products in the region best adapted for that purpose. That would create a cheap food supply for the more northern states, which could then be entirely devoted to the cultivation of the more valuable tropical crops of coffee, sugar, etc.

The plans succeeded so well that the government was soon afraid of the preponderating influence of the German population in the south and began to favor the immigration of Italians and Poles, of whom about 100,000 came in the years 1890 and 1891. The liberal provisions of the law were not, however, carried out long, and the government confined itself later on only to granting free passage to the country, employing the newly arrived immigrants in road-building on the land which they were to settle. This naturally led to a decline in immigration, since the newcomers found it difficult, if not impossible, to save enough from their small earnings as laborers to buy land and cultivate it. In 1891 a new colonization law was enacted which favored colonization by strong financial companies willing to invest large sums of capital for the purpose. Any company could purchase from the government great tracts of land at 20 cents per acre, which were to be resold to colonists whom the companies were to bring into the country at their own expense. The government was to pay the companies a subsidy of \$230 for each family brought in, and \$700 additional for each mile of road laid out. The terms of the new law were so favorable that companies immediately formed and secured concessions for more than 150,000 square miles of land. But the political troubles which set in in 1893 put an end to financial aid by the government, which amounted to about \$25,000,000 until 1890. The total immigration during

1854-1904 was 2,096,576, of whom 1,030,000 were Italians, 465,000 Portuguese, 216,000 Spaniards, and 70,000 Germans. The highest number of immigrants was in 1891 (216,659), and the lowest in 1904 (12,447). In 1911 136,000 immigrants entered the country, of whom 48,000 were Portuguese, 27,000 Spaniards, 23,000 Italians, 14,000 Russians, and 4250 Germans.

Education is in an extremely backward state, especially in the interior of the country. Primary instruction is free, and every parish is supposed to possess one teacher for boys and one for girls, but education is not compulsory, and the pupils attending the schools constitute but a very small fraction of the population of school age. The percentage of illiteracy for the entire nation is over 80. In the cities the level of general culture is much higher, for they contain all the institutions of secondary and higher learning controlled by the federal government. At Rio de Janeiro are the two high schools, known jointly as the *Gymnasio Nacional*. Several cities have schools of medicine and schools of law and political science, and there are various military, engineering, industrial, agricultural, and technical schools. In 1910 there were 12,221 primary schools, with 634,539 pupils (352,418 boys, 282,121 girls). Of the schools 2695 were private, 2608 municipal, and 6918 government. In 1909 secondary schools numbered 327, with 30,258 students. The larger cities have museums and libraries, and the National Library at Rio de Janeiro has a magnificent collection of printed volumes, manuscripts, and iconographical exhibits, numbering, in all, over 525,000 pieces.

Religion. Church and state are entirely separated, but the government provides for the maintenance of the Roman Catholic religion, which is the faith of 99 per cent of the people. The country is divided into 11 episcopal sees, in each of which a theological seminary is located. The Archbishop of Bahia is metropolitan of the province, and under him are 11 bishops, 12 vicars-general, and about 2000 curates.

History. By the provisions of the Treaty of Tordesillas, signed by Portugal and Spain in 1494, most of the territory within the present limits of Brazil fell to the share of the former. Early in 1500 Vicente Yáñez Pinzón landed on the coast of Brazil, probably near Cape St. Augustine, and coasted as far as the Orinoco River, discovering the mouth of the Amazon. In the same year Pedro Álvarez Cabral landed at Porto Seguro and, taking possession of the country in the name of his monarch, gave it the name of Vera Cruz, later changed to Santa Cruz. In 1501 and 1503 the country was visited by expeditions under Amerigo Vespucci, who in the latter year left a garrison of 24 men behind him and returned with a cargo of brazilwood, which gave the vast region its name. The first permanent settlement was made by the Portuguese on the island of São Vicente in 1501, other colonies founded subsequently being abandoned on account of the hostilities of the Indians. Bahia was founded in 1549 and till 1763 was the capital of Brazil. The Huguenot settlement established in the Bay of Rio de Janeiro in 1558 was broken up in 1567 by the Portuguese, who founded the town of Rio de Janeiro. From 1580 to 1640 Brazil as a dependency of Portugal was in the possession of Spain, and in the latter part of this period the Dutch, who were at war with Spain, seized upon a considerable portion

of the country, which they held for some time. The fall of Bahia in 1624, under the attack of the fleet sent out by the Dutch West India Company, brought Spaniards and Portuguese together in an effort to regain the city. In this they were successful in 1625, with the aid of the natives. This incident had important sociological results, for the honors conferred upon the chiefs for their help broke down to a large extent the barrier between the two races, and to this day among the better classes of Bahia there is a greater admixture of native blood than is to be found elsewhere in Brazil. In 1630 the Dutch captured Pernambuco and retained the stronghold of Olinda till 1654. But even with this last stronghold gone, it was not until 1662 that Holland admitted its defeat and renounced by treaty with Portugal all territorial claims in Brazil, in exchange for a cash indemnity and a few trading privileges. In 1710-11 France made an invasion of Brazil that was only partially successful. Between Portugal and Spain there was a long-standing dispute concerning the possession of the eastern shore of the La Plata, which was not settled until 1828, when Brazil recognized the independence of the Banda Oriental. (See URUGUAY.) The discovery of gold in 1691 and of diamonds in 1710 resulted in the rise of a number of mining towns. The arbitrary colonial order under which Brazil had been settled was the so-called hereditary captaincy system (similar to the patron system in New York). Although it had been successful in Madeira and the Azores and was beneficial in the opening stages of Brazilian history, it did not work out well in the long run and is considered by some to have greatly retarded the progress of the country. In 1807, under the pressure of French invasion, the royal family of Portugal fled to Brazil, which remained virtually the seat of government until 1821, when King John VI returned, leaving his eldest son, Dom Pedro, as Prince Regent, but in the following year (Sept. 7, 1822) the independence of Brazil was proclaimed, and on October 12, the Prince Regent was crowned Emperor. Early in 1824 he took his oath to the constitution, and in 1825 the independence of Brazil was formally recognized by the Portuguese King. Dom Pedro soon became unpopular, and his unpopularity was only slightly diminished when, upon his father's death, he was unanimously recognized as King of Portugal. Nor did his prompt abdication of that crown in favor of his daughter Maria stem the rising tide of his unpopularity. Consequently, in 1831, he felt constrained to abdicate even the Brazilian Imperial crown in favor of his five-year-old son.

Under the regencies which followed, Brazil was plunged into disorder and political intrigue, and the result was that, as a reaction against republicanism, the young prince was declared of age in 1840, and in 1841, at the age of 15, was crowned Emperor, as Dom Pedro II. The only wars during his reign, aside from a few revolutionary outbreaks, were those waged against Rosas, the Dictator of Buenos Aires, in 1852 and against Paraguay in 1865-70. Pedro II was a patriotic and enlightened monarch. Among the events of his administration was the passage of an act in 1871 providing for the gradual abolition of slavery. The centralized system of government, however, and the general prevalence of corruption in the provincial

administration, excited a widespread feeling of discontent, especially in the army, and an attempt in 1889 to form a national guard under Imperial control hastened the crisis. On November 15 intelligence that Rio de Janeiro was in the hands of the insurgents reached the Emperor at his countryseat, and on hastening to the capital he found that the ministry had been deposed. Later in the day a provisional government, headed by Marshal Deodoro da Fonseca (qv), was organized, which issued a manifesto proclaiming a republic. All these changes met with little opposition, indeed, it had been long and widely believed that the Empire would not outlive the Emperor. Dom Pedro attempted to form a new ministry, but failed, and a new decree ordered him to leave the country with his family within 24 hours. The same decree continued the Imperial dowry and granted the Emperor a subsidy of \$2,500,000, both of which he refused. All his private possessions were respected, and his daughter continued to possess them. On the following day, November 16, the Emperor and his family embarked for Portugal, and the concession (November 21) of universal suffrage to all Brazilians that could read and write was followed by the appointment of a commission to draft a federal constitution. On Jan. 10, 1890, the separation of church and state was decreed by the provisional government. The new constitution (subject to further revision) was promulgated on June 23. In February, 1891, Marshal Fonseca was elected the first President of the republic, but before the close of the year his arbitrary proceedings provoked a revolutionary movement in Rio de Janeiro, which forced him to resign. He was succeeded by the Vice President, Gen. Floriano Peixoto. In 1893 a revolt, probably aiming at the restoration of the Empire, was headed by Admirals Da Gama and Mello and supported by the navy. Rio de Janeiro was blockaded and shelled by the rebels, but, owing largely to the unfavorable attitude of the United States, whose war vessels broke the blockade, the revolt (which was accompanied by insurrections in some of the states) collapsed early in 1894, and the insurgents fled or surrendered.

Peixoto was succeeded later in the same year by Dr. Prudente de Moraes. Another rising, headed by a religious fanatic, Antonio Conselheiro, broke out in 1897 in the state of Bahia. It was probably assisted financially to some extent by the partisans of the old Empire, and threatened for a few months to cause the government much trouble, but it was eventually crushed. An attempt to assassinate President Moraes on November 5 of the same year resulted in the discovery of an important plot against the existing government, which immediately collapsed. In November, 1898, Dr. Campos Salles succeeded Moraes as President. He was succeeded in 1902 by Dr. Rodrigues Alves. The frontier toward French Guiana was determined by a decision of the Swiss Federal Council in December, 1900. The dispute with Great Britain over the Guiana frontier was referred for arbitration to the King of Italy, whose award, rendered in June, 1904, gave about 19,000 square miles to Guiana and 14,000 square miles to Brazil. More important was the settlement in November, 1903, of the dispute with Bolivia over the Acre territory. Bolivia gave up all claims to Acre (73,750 square miles) in return for a cession of 886 square miles on the affluents of

the Abuna and Madeira, of 335 square miles on the left bank of the Paraguay, and a payment of \$10,000,000 to be expended by Bolivia on railroad construction in the border territory. Brazil also undertook to construct a railway along the rapids of the Madeira, connecting the upper and lower navigable portions of the river and thus aiding the foreign commerce of Bolivia. Complications now resulted between Brazil and Peru which advanced claims to the Acaré region, it was agreed to arbitrate the question. Dr. Afonso Penna was elected President in 1906. Marshal Hermes da Fonseca was elected President for the term 1910-14.

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BRAZIL. A city and railroad centre, the county seat of Clay Co., Ind., 57 miles west-southwest of Indianapolis, on the Central Indiana, the Chicago and Eastern Illinois, and the Vandalia railroads (Map: Indiana, B 3). Block-coal mines in the vicinity are the field of the chief industry. The city has manufactures of mining engines and machinery, tile, pianos, tin products, wire fence and wire-fence machines, lathes, sewer pipe, pumps, and brick. An almost inexhaustible supply of clay and shale of superior quality opens up possibilities for an immense trade in clay products, the manufacture of which is already considerable. Brazil owns and operates its water works and has a Carnegie library. Settled in 1856, it was first incorporated in 1873. Under the present charter, Brazil is governed by a mayor, elected every four years, and a city council. Pop., 1890, 5905; 1900, 7786; 1910, 9340.

BRAZIL, ISLAND OF. See MYTHICAL ISLANDS.

BRAZIL CABBAGE (so called on account of its southern origin), or CHOU CARABE (*Caladium sagittifolium*, or *Xanthosoma sagittifolium*). A plant of the family Araceæ and native of the West Indies. It is extensively grown in Porto Rico under the name Yautia. The rhizomes are rich in starch and form an important source of food in the regions where it is cultivated; the leaves are also boiled and used as "greens." Both root and leaves are almost entirely destitute of the acidity so generally characteristic of the order.

BRAZILETTO WOOD. See BRAZIL WOOD.

BRAZILIAN COCOA. See GUARANA.

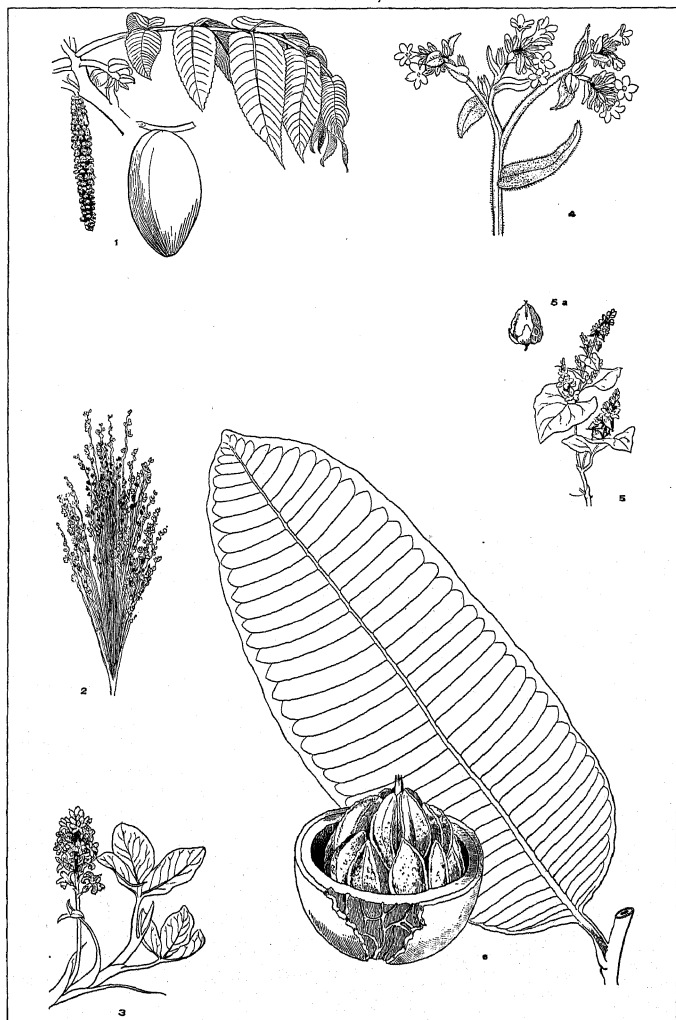
BRAZILIAN GRASS. An incorrect name applied to a substance used in the manufacture of a cheap kind of hats, known as Brazilian grass hats and also as chip hats. It consists of strips of leaves of a palm (*Chamarops argentea*), which are imported to Great Britain and elsewhere for this manufacture, chiefly from Cuba. See CHALMEROPS.

BRAZILIAN PLUM. See HOG PLUM.

BRAZIL NUTS, CREAM NUTS, or NIGGETTES. Seeds of *Bertholletia excelsa*, a majestic and beautiful tree of the family Myrtaceæ. It grows to the height of 100 or 120 feet and abounds on the banks of the Orinoco and in the northern parts of Brazil. It produces a round, woody pericarp, or seed vessel, almost as large as a man's head, within which are many of the seeds, or nuts. The pericarp is very heavy and solid, requiring the blow of a hammer to break it; when ready to fall, it is dangerous, on account of its weight, to walk under the tree. The seeds, which are popularly called nuts, vary from 18 to 24 and are wrinkled and triangular, having a hard shell and a pure-white kernel, which when fresh is very agreeable. They are chiefly exported from Pará and French Guiana and are well known in stores. They yield a large quantity of oil, which is good for burning. The nuts of the monkey-pot tree, *Leocythæ Ollaria* and *L. Zabucajo*, are produced in a pericarp which resembles a rusty iron pot with a lid, the lid dropping off and letting out the seeds, which are oblong, grooved, and esteemed superior to the common Brazil nut. They are sometimes known as Sapucaia nuts or Paradise nuts, but they have not yet become a common article of commerce, as the trees grow chiefly in the interior parts of the country. See accompanying Plate, and also Plate of BREADFRUIT, etc.

BRAZILWOOD. A dark-red or yellowish brown dyewood, which forms a considerable article of export from Brazil, where some of the trees which yield it are very abundant. It is the product of a different species of *Cesalpinia*. The best kinds are those called Pernambuco wood, All Saints' wood, and St. Martha wood. Some confusion exists as to the exact botanical identity of the different varieties of brazilwood. Much of the brazilwood of commerce is obtained from *Cesalpinia brasiliensis*, a tree which is a native of the West Indies, commonly growing in dry places and among rocks, and seldom exceeding 30 feet in height. It has bipinnate leaves, with many smooth, obtuse, oblong leaflets and no terminal leaflets, the flowers in panicles, with downy stalks. The heartwood alone is of any value. Pernambuco wood is the product of *Cesalpinia echinata*. The sapwood is extremely thick, and the valuable heartwood bears a small proportion to the whole diameter of the

BRAZIL NUT, ETC.



1. BUTTERNUT (*Juglans cinerea*).
2. BROOM CORN (*Sorghum vulgare*).
3. BUCKBEAN (*Menyanthes trifoliata*).

5. BUCKWHEAT (*Fagopyrum esculentum*).
5a. BUCKWHEAT, enlarged grain.
6. BRAZIL NUT, LEAF AND POD (*Bertholletia excelsa*).

stem. The sapan wood (qv) of the East Indies nearly approaches brazilwood in quality. It is the product of *Casalpinia sappan*, a small, thorny tree. The brazilletto wood, sometimes also called brazilwood, which is brought from the Antilles, is much inferior. *Casalpinia crista* probably yields some of the inferior West Indian brazilwood. Brazilwood is said not to take its name from Brazil, but to be mentioned under the name Braxilis in documents much older than the discovery of America, the sapan wood of the East Indies being probably intended.

When freshly cut, the color of brazilwood is yellow, but when exposed to air, moisture, and light, it becomes red, and is generally sent into market ground down to the size of ordinary sawdust. When treated with water, alcohol, or ether, the weathered brazilwood readily yields up its red coloring matter, called "brazin." Strong decoctions of brazilwood are used by the dyer and calico printer in the fabrication of reds, browns, etc. It is also used in the manufacture of red ink and as an indicator in analysis, alkalies changing the solution to bluish violet and acids to yellow. Brazilwood as a dyestuff has been largely superseded by synthetic dyestuffs. See INK.

BRAZING, braz'ing, or BRASS SOLDERING

The process of uniting two pieces of brass, copper, cast iron, malleable iron, steel or common iron, or one of each, by means of a hard solder, partaking more or less of the composition and properties of ordinary brass. (See ALLOY.) The edges or parts of metal to be joined are first filed bright, so as to be thoroughly clean, then there is strewn over the gap or crevice a mixture of the solder and borax, or some composition including boracic acid, and then heat is applied. In some cases the parts to be united should be heated before the flux (which should be appropriate to the particular joint in hand) and brass are applied. In brazing a form of solder appropriate to the kind of work is employed, those used for the purpose varying considerably in composition. (See SOLDER.) Most of these solders consist of alloys of copper and zinc, though sometimes tin and other metals are added. The various metals are fused together, allowed to cool, and then filed down to a coarse powder, in which form the solder is used. The borax or other flux is employed to form a glaze over the brightened surfaces and thus prevent the oxidation of the metal, which would seriously interfere with and even stop the operation. An outward coating or layer of charcoal is likewise serviceable in the exclusion of the air during the brazing of large pieces of metal. Where a very high heat is required in the process, a little powdered glass is mixed with the borax. The mixture of solder and borax may be applied dry, but it is better to moisten it with water and to lay it on the filed surfaces with a spoon. The whole is then gently heated, when the water evaporates, and a crust of borax and solder is left. The work may now be strongly heated before the blowpipe or over a clear fire, and at a bright-red heat the solder fuses and the zinc begins to burn with a pale-blue flame. At this stage the solder flushes or becomes liquid enough to permeate the joint or crevice, but should it be tardy in acting thus, several slight taps will insure the proper result. The whole is now cooled, and toward the close of this process the articles may be introduced into cold water for more rapid reduc-

tion in temperature. Pieces of metal which have undergone the process of brazing are so firmly united that they may be rolled and re-rolled without the parts yielding.

BRAZOS, bra'zós (Sp. pl. of *brazo*, arm, so called on account of its being formed by the two confluents.) One of the largest rivers of Texas, formed by the junction of Clear and Salt forks, in Young County (Map Texas, D 4). It flows southeast in a tortuous course and empties into the Gulf of Mexico about 40 miles to the southwest of Galveston. It is about 900 miles long and drains a very extensive area. It is navigable during high water for a distance of 300 miles from its mouth and at all times to Columbia, 40 miles from the Gulf. It flows through a generally fertile country, the lower part of its course being through alluvial deposits.

BRAZOS DE SANTIAGO, dà san'te-á'gò. A port of entry in Cameron Co., Tex., on Brazos Island, Gulf of Mexico about 35 miles northeast of Brownsville (Map Texas, D 4). It has considerable coasting and foreign trade, the latter being valued at about \$1,260,701 in 1912, of which over 80 per cent were exports. A shifting sand bar, which rarely admits vessels of over 10 feet draught, is a hindrance to the commerce of the port.

BRAZZA, brat'sa (Slav *Brac*, from Lat. *Brattia*, *Brattia*, *Brachia*). The largest island of the archipelago forming a part of Dalmatia, Austria-Hungary, in the eastern part of the Adriatic Sea, about 8 miles south of Spalato (Map Austria, E 5). Area about 150 square miles. The surface is somewhat mountainous, but the soil is fertile, and olives, figs, grapes, almonds, saffron, and silkworms are cultivated. It has celebrated marble quarries. Pop., 1900, 24,465, 1910, 22,967. The chief towns are San Pietro, Milna, Bol, and Neum. The island forms a separate administrative division of Dalmatia.

BRAZZA [PIERRE PAUL FRANÇOIS CAMILLE], SAVOIGNAN, COMTE DE (1852-1905). A French explorer born on board a vessel in the harbor of Rio de Janeiro. He was educated at the French Naval Academy, became a naturalized French citizen, and entered the navy in 1870. After several years of service in West Africa he attracted attention by exploring the Ogowe River (1876-78). He found that the Ogowe and Alima rivers, with a land portage between them of 25 miles, offered a route between the upper Congo and the sea. In 1879 he founded two stations as bases of supplies for his new route—one (Francenville) on the upper Ogowe, the other (Brazzaville) on the Congo itself. In 1880 he made a treaty with King Makoko, who put his possessions under French protection and ceded to Brazza the site for his station, Brazzaville. Later he discovered a route by way of the Niari River which supplied a shorter water route between Brazzaville and the coast. He established stations and won over the natives to French allegiance. In 1886 he was made Commissioner General of the government in French West Africa. Reappointed in 1897, he introduced various reforms and put steam launches on the Congo and the Ogowe. He was very tactful and had great influence with the natives. Illness compelled him to return to France, but in 1890 he accepted the appointment of Commissioner General of the entire French Congo, with Gabon under his direct authority. In 1897 he went back to live in France. It

was due chiefly to his gifts as explorer, organizer, and administrator that the French Congo was added to France's domain. In February, 1905, he was sent by the French government to the Congo region to investigate charges of brutality on the part of French officers toward the natives and seemed to have established the truth of some of these accusations. He was returning from this mission when he was taken ill at Dakar, where he died (Sept. 15, 1905).

BREACH (ME. *breache*, fracture, from *break*; AS. *brecan*, just as *speech* is from *speak*). In military siege operations, a gap made in any of the defensive works of a fortified position or intrenchments, or in the walls or gates of a city. Before the introduction of modern high-power guns the most elaborate tactics were employed to obtain this result. Breaching batteries were used to destroy walls by directing and lodging the shot or cannon balls in two vertical lines, from the parapet of the wall downward, and in a horizontal line, connecting the lower ends of those vertical lines, thus overturning the weakened part and enabling the besiegers to attempt an entrance by the breach so made. Notable and historic examples are to be found in the Peninsular War (1808-14), when at Badajoz 14,000 shot, fired from a distance of 450 yards, brought down 180 feet of wall in 104 hours. At Ciudad Rodrigo 6700 balls, from a distance of 560 yards, reduced 105 feet of wall in 32 hours. At San Sebastian 13,000 shot brought down 100 feet of wall in 62 days from a distance of 620 yards. At Fort Pulaski (1862), in the American Civil War, it is estimated that in breaching the brick wall of the fort, 110,000 pounds of metal from 38 guns struck it in the course of a two days' bombardment from an average distance of 1687 yards, making an average of 2500 pounds to the square foot. The term "breach" is also applied to an opening made by attack in a line of defense, even when it is unfortified. See SIEGE and SIEGEWORK; FORTIFICATION.

BREACH. In law, the violation of a legal obligation, whether voluntarily assumed or imposed by law. The obligation may be personal, i.e., imposed upon or assumed by a certain individual, as the duty of support of wife and children resting upon a husband or father, or the obligation of a person under a contract by which he has bound himself, or it may be general, i.e., imposed by law on the entire community or upon a class of persons, as the duty of each and everybody to refrain from trespassing upon private land or from violating the peace and security of the state. In the former class of cases, known as obligations in personam, the breach can be committed only by the specific individual upon whom the obligation rests; in the latter class of cases known as obligations in rem, i.e., with respect to a certain thing or a certain right of an individual or the state, the liability for the breach falls upon any one who may happen to violate the obligation.

A breach may consist either in an act violating a public or a private duty or, negatively, in the neglect or refusal to perform an act which one is under a duty to perform. The consequences of a breach are various, depending on the nature of the obligation violated. In the case of an absolute right, as the right of a possessor of land to be protected against an invasion of his possession, any entry on his land,

however innocent and unintentional and whether resulting in damage or not, constitutes a breach of his possession, whereas other rights, which may be called relative, as the right of a property owner to be free from nuisance, are infringed only by acts which inflict a material injury.

A breach of whatever sort and by whomsoever committed gives rise ipso facto to what is known as a remedial right in the party, whether the state or an individual, whose right has been infringed, i.e., to the appropriate legal proceedings for the protection or vindication of the right. Breaches of a public duty are usually, though not always, punishable as crimes. Sometimes they involve only forfeiture of goods or a penalty to be recovered by a civil action, or the summary action of a court of equity as for a contempt. Breaches of private obligations—classified as breaches of contract, quasi contractual obligations, torts, quasi delicts and breaches of trust—are usually punishable by an action for damages and sometimes also by a decree in equity, restraining or directing the performance of an act. Certain acts, classified as torts or private wrongs, may at the same time be public offenses and, as such, punishable by the criminal law, as libel, assault and battery, and breach of trust.

It is a characteristic of our system of remedial justice that its remedies are not generally available until after a breach of legal obligation has been committed and the injury involved therein sustained at least in part. In other words, the courts exercise a remedial, not a preventive justice. This is true even of the equitable remedies of specific performance of contracts and specific reparation for torts, the breach of contract or the infliction of the wrong known as a tort being a condition precedent to the right to invoke the remedy. However, as is obvious from the nature of these remedies, the breach need not be complete, nor, in the case where the remedy in equity is sought against a tort, can it have been complete, for the object of the proceeding is to restrain future breaches like those already committed, as in the case of continuous nuisances or repeated acts of trespass.

Not every act which results in harm to another is punishable as a breach. Thus there are many such acts, which may or may not be morally reprehensible, for which the law affords no remedy, as the withdrawal of subterranean waters from a neighbor's land or the sacrifice of another's life to save one's own. To the consequences of such acts as these the phrase *damnum absque injuria* (damage without legal injury) is applied.

For specific illustrations of the principles above laid down, see: BREACH OF CLOSE; BREACH OF CONTRACT; BREACH OF PROMISE; BREACH OF TRUST; BREACH OF PEACE; BREACH OF WARRANTY; CRIME; QUASI CONTRACT; TORT; SPECIFIC PERFORMANCE; DAMAGES.

BREACH OF CLOSE (OF, and Fr. *clos*, an inclosure, from Lat. *clausus*, p.p. of *claudere*, to shut, close). The technical legal phrase to describe the wrongful act of entering without authority on land in the possession of another. It is the *gravamen*, i.e., the substantial ground, of the action of trespass. The possession of land is so jealously guarded at the common law that the possessor's premises are regarded as a close (*clausum*, an inclosed place) and any invasion of the possession as a "breaking and en-

teing." Accordingly the writ of trespass, whereby the action was formerly instituted, commanded the defendant to show cause why he had broken the plaintiff's close (*quare clausum quarentis fregit*) and concluded, as in criminal informations, that the act complained of was contrary to the peace of the king (*contra pacem regis*). As a matter of fact no actual breaking of an inclosure was ever requisite to constitute the offense, the breach consisting, as it still does, in the mere act of being unlawfully, i. e., without authority, on the land of another, however the entry may have occurred, unless it was due to inevitable accident. Nor need the wrongdoer, in fact, enter upon the premises in person. It is enough to discharge water, or throw a stone upon another's land, or send one's dog upon it, or negligently permit one's cattle to invade it, to constitute a breach of close. See **TRESPASS** and the authorities there cited.

BREACH OF CONTRACT The failure, deliberate or unintentional, to do any lawful thing which one has bound himself by contract to do. It is not every non-performance, however, which results in a breach of contract. In certain cases, if the contractor has acted in good faith and has substantially performed, it has been held that a slight deviation from the contract will not constitute a breach thereof. This principle is of frequent application in the adjustment of rights under building contracts. The consequences of a breach depend on the nature of the contract and upon the character of the breach. In a unilateral or one-sided contract, i. e., where only one of the parties is under an obligation to do or not to do a specified thing, a breach entitles the other party, at his election, either to disaffirm the contract and recover the consideration given by him therefor, or to an action for the damages resulting to him from the breach. In bilateral contracts, on the other hand, where both parties are bound to performance, the default of one entitles the other to an action for damages and, in some cases, also to disaffirm the contract and refuse to perform or to complete performance on his part. The latter remedy is available only in case performance by the party not in default is dependent on due performance by the party in default. Thus happens where performance by one party is made a condition of performance by the other, or, as it is commonly expressed, where a term or stipulation is expressly declared or is construed by the court to be "of the essence" of the contract. Thus the time of payment of a sum to be advanced by a party is not generally of the essence of a contract, but it may be expressly declared so to be, or it may from the nature of the contract appear to have been so intended. In certain cases, as in an agreement for the conveyance of land, the party not in default may have a decree of specific performance, directing the defaulting party to perform.

To constitute a breach of contract it is not necessary that a demand of performance be made, either before or after default, and that such performance be formally refused. Indeed, it is now settled in England, in the United States Supreme Court, and the courts of many of the States, though the doctrine is repudiated in Massachusetts and a few other States, that one may be guilty of a breach of contract before the time for its performance has arrived.

For example, a person contracts to sell and convey certain property at a future time. Before that date he notifies the other party that he will not carry out the contract, or he sells and conveys the property to a third person. He is liable for an "anticipatory breach," as it is called. This doctrine proceeds upon the theory that the parties of a contract have the right to the maintenance of it up to the time of performance, as well as to its performance when due. See **BREACH, CONTRACT, SPECIFIC PERFORMANCE**, and the authorities there referred to.

BREACH OF PROMISE The popular expression for the violation of an agreement of marriage. The rights and obligations of the parties to a marriage are not contracted in character, but are imposed by law as an incident of the marriage relation. But the agreement of a man and woman to enter into that relation is a simple contract, the promise of the one party being the consideration for that of the other. There may be other considerations, as a conveyance of property or a promise to make such a conveyance, but the contract of marriage, as it involves the union of two parties in a new relation, is unique in this respect, that it necessarily involves the exchange of mutual promises of marriage. It falls, therefore, into the class of *bilateral* contracts. As the contract may now generally be entered into informally, i. e., without a writing or a ceremony of betrothal, so it may be varied from time to time, as by a change in the date of performance or may even be abrogated in the same way, without writing or other formality.

The contract of marriage is subject to the ordinary rules governing the validity of contracts in general. Both parties must be of sufficient mental capacity to contract, and both must have reached the age fixed by statute as the "age of consent." A contract made by a minor who has reached the age of consent is not void but is voidable by him at his election, but cannot be avoided by an adult who has entered into such an engagement with him. Impossibility of performance, whether existing at the time the contract was made or subsequently occurring, excuses both parties. It appears to be settled in England that bodily infirmity or unfitness of the defendant will not excuse his or her breach of this contract, although it will warrant the other party in refusing to perform the contract. In the United States it has been held that incurable physical unfitness for the marital relation, arising subsequent to the betrothal, is a legal excuse for refusing to marry. Chastity and modest conduct is a condition subsequent, by the breach of which the defendant is released from his obligation. If one party induces the other to enter into a contract to marry by fraudulent representations, the party defrauded may maintain an action in tort for the damages sustained. But ordinarily an action for breach of promise is a contract action, although it has many of the characteristics of a tort action. For example, at common law, the right of action does not survive the death of either party to the contract, in the absence of special damage to the personal estate of the deceased, such as expenditures made in contemplation of marriage and lost by reason of the breach, the plaintiff may recover punitive damages, under many statutes the defendant is liable to arrest as though he were charged with fraud, and if a judgment is recovered against

him, execution may issue against his body. Ordinarily, however, the only remedy for breach of promise is an action for damages. The equitable remedy of specific performance is never granted. Repeated attempts have been made in England to abolish actions for breach of promise to marry by act of Parliament. Although these attempts have been unsuccessful, it is declared by English writers that breach-of-promise suits have not borne as abundant harvests in England as in the United States. The action may be brought by either party, but suits by men for breach of promise are rare. For further particulars see MARRIAGE, BETROTHAL; CONTRACT; TORT, and the authorities there referred to.

BREACH OF THE PEACE. In the most general sense, any violation of the peace and order of the state, i.e., any criminal offense. The "king's peace" denoted the state of order maintained by the royal authority—originally, perhaps, only in the palace and its immediate vicinity, then throughout the territory in which the king's writs ran and his itinerant justices exercised the royal jurisdiction. So every territorial lord had his "peace," which was coextensive with his manor or lordship, every sheriff had his, which extended over the county in which he exercised jurisdiction. Any act which violated the peace of the king, the lord, or the sheriff was punishable in the court and by the law of the king, of the manor, or of the county, as the case might be.

As the local law often differed in important respects from the general law of the land, for example, the law of the manor in which the offense was committed from the common law of the realm, an act might be a breach of the lord's or the sheriff's peace and yet not a violation of the king's peace. Where, as was usually the case, the act complained of was at one and the same time a breach of the local and of the general peace, it was *prima facie* punishable in the local court, unless the accusation asserted that the act was a violation of the peace of the king (*contra pacem regis*), when the king's court would *ipso facto* acquire jurisdiction to the exclusion of that of the local tribunal, and the offense become punishable by the common or statute law of the realm instead of by the local law.

In modern usage, breach of the peace is employed to describe certain specific offenses in which the public order is disturbed, such as rioting, disturbing a lawful meeting, taking part in an unlawful assembly, engaging in a prize-fight, unlawfully discharging firearms in a public place, and the like. Formerly in England participation in an unlawful assembly of 12 persons or more constituted a breach of the peace, only, however, if the participants refused to disperse after being ordered by proclamation so to do. As the proclamation included the reading of the Statute of 1 Eliz., c. 16, relating to rioting, the practice came to be known as "reading the Riot Act." Under modern statutes, in this country as well as in England, no proclamation is necessary to fix the liability for a breach of the peace by rioting or unlawful assembly.

A person shown to be likely to assault or persistently annoy another may be required to give security for his good behavior. Though the act threatened may not be a breach of the peace in the modern sense of the term, the process is

commonly described as putting the wrongdoer under bonds to keep the peace.

See ASSEMBLY, UNLAWFUL; RIOT, and the authorities there referred to.

BREACH OF TRUST. The violation by any one in a fiduciary relation to another of the legal or equitable duties imposed by virtue of that relation, specifically the violation by a trustee of any of his obligations of his trust. Such breach may take on a variety of forms, but is usually committed by the neglect or refusal of a trustee to pay to the beneficiary a sum of money payable by the terms of the trust, or to convey to the beneficiary (technically called the *cestus que trust*) or to a person designated by him, property to which he is entitled, or by the alienation to a stranger of property which it is the duty of the trustee to hold for the beneficiary, and generally by any mismanagement of the property held in trust. A breach of trust may render the trustee liable to respond in damages, or to removal from his trusteeship, or to criminal prosecution, according to the nature of his misconduct. Some modern statutes have so extended the crime of larceny (*qv*) as to include a breach of trust, if the latter consists in secreting, withholding, or otherwise converting to the trustee's own use, property which has come into his possession by virtue of his trusteeship. See TRUST; TRUSTEE.

BREACH OF WARRANTY. A violation of a contract guaranteeing the validity and soundness of the title to real property and agreeing to protect the same against any lawful claim to the property that may be set up by the warrantor or any other person. Such contracts are an ordinary incident of conveyances of land and may be made by the grantor or by another. They belong in the class of contracts known as "covenants running with the land" and may accordingly be enforced not only by the covenantee or immediate grantee, but by any subsequent holder of the land who derives his title from such grantee. Although the title to land conveyed may at the time of the warranty be defective, there is no breach until the person claiming under such title is evicted, either by the grantor or those claiming under him or by a third person under a lawful claim of title. The covenant does not protect the covenantee or grantee or his successors against unfounded claims unless asserted by the covenantor or grantor. The remedy for the breach is an action for the damages sustained in consequence of the eviction of the person protected by the covenant and usually consists of the price paid for the property with interest. See DEED; TITLE; WARRANTY.

BREAD (AS. *brōad*, Icel. *braup*, Ger. *Brot*, akin to AS. *brocnean*, Eng. *brew*, *broth*). Cereals of some kind or other have always made an important item of human food, and of all the forms in which they have been used bread has proved the most satisfactory. Wheat, rye, corn (maize), and oats are commonly used for bread making; less commonly, barley, buckwheat, rice, etc. To prepare the grain for bread making it is usually cleaned, crushed, and bolted to obtain a fine, soft powder called flour or meal. The flour is made into a dough with water and baked. Sometimes the dough is made with milk, or milk and water. Salt is usually added and often a little sugar and lard or butter. If the dough is fermented or leavened in any way be-

fore baking, the resulting product is called leavened bread. If no leavening agent is used, unleavened bread results. The common leavening agents are yeasts, both wild and cultivated, leaven, i. e., dough saved from a previous baking, and chemical mixtures or baking powders. The bread most commonly eaten in the United States, and often called white bread, is made, whether at home or at a bakery, from some one of the high grades of wheat flour or from a mixture of two or more grades. It is usually leavened with yeast.

The primitive way of making bread was to soak the grain in water, subject it to pressure, and then dry it by natural or artificial heat. An improvement was to pound or bray the grain in a mortar, or between two flat stones, before moistening and heating. A rather more elaborate bruising or grinding leads to such simple forms of bread as the *oat cakes* of Scotland, which are prepared by moistening oatmeal with water containing common salt, kneading with the hands upon a baking board, rolling the mass into a thin sheet, and then heating before a good fire or on an iron plate called a girdle, which is suspended above the fire. In a similar manner the barley-meal and pease-meal *bannocks* of Scotland are prepared. In Eastern countries, as well as in Scotland, wheat flour is kneaded with water and rolled into thin sheets called *scones*. The most interesting of the unleavened breads is, perhaps, the Passover bread, which has been used during Passover week by orthodox Jews from the time of Moses until now. It is simply a mixture of flour and water baked in small round cakes until it is dry and hard, and is not unlike plain water crackers. Pilot bread, or ship's biscuit, is another simple preparation of flour and water, so cooked that it can be kept for almost any length of time. Crackers, or biscuits, as they are often called, especially in England, are varieties of unleavened bread. Milk, butter, lard, spices, dried fruits—anything or everything desired to give them particular consistency, color or flavor—is mixed with the flour and water, and the dough is then passed through very ingenious cutting machines and quickly baked in a hot oven. Such crackers are a concentrated form of nourishment, as they contain little water in proportion to their bulk and are fairly solid in consistency.

Leavened or fermented bread is rendered light and porous by carbonic-acid gas, which distends it. This is provided (1) by the use of leaven or of yeast, which causes the carbonic acid to form by the action of fermentation, or (2) by the use of baking powders, which supply the necessary carbon dioxide to the dough by chemical reaction, or (3) by adding the gas to the dough directly, as in aerated bread. Leaven is simply dough, or a mixture of flour, which is in a state of fermentation. The knowledge of its action may have been accidentally discovered by attempting to combine with a fresh mixture dough which had been left over from a previous baking. It is probable that the use of leaven was first known to the Egyptians, that the Greeks and Jews learned it from them, and the Romans from the Greeks. Through the Romans this knowledge was spread far and wide through the subject nations which came under their influence. This method of bread making is still extensively employed in certain parts of Europe. Great care and skill are required in the making of leavened bread. There is always dan-

ger that during the process of fermentation lactic acid and other products which are disagreeable to the taste will form along with the carbonic-acid gas, then, if the leaven stands too long, it will reach the state of putrid fermentation.

With the knowledge of the yeast plant (see YEAST), first applied to beer making, the method of making fermented bread has been changed by substituting yeast for leaven. The action of the yeast plant—like that of leaven—when brought into contact with flour and water is to develop carbon dioxide and alcohol, the latter passes off in the oven in the form of vapor, the former is largely retained in the dough. The lightness of the bread depends upon the amount of this gas which remains imprisoned in the dough and distends it, hence it is due to the tenacity with which the grains of flour cling together, or, in other words, to the stickiness of the flour. It is in this respect that the superiority of wheat flour over that from all other grains lies. The sticky gluten of wheat does not allow the gas to escape. For this reason the quality of bread made from less tenacious flour is improved by mixing with it a portion of wheat flour.

The chemical reactions concerned in bread making and the conditions under which they are produced are easily understood. The process consists in adding to the flour and warm water the necessary amount of yeast. The yeast may be added directly or a preliminary ferment may be formed by mixing it with potatoes. If the latter method is employed, the yeast is put into a thin liquor, formed by mixing mashed potatoes with warm water, and the mixture is allowed to ferment for some time. The advantages claimed for the potato ferment are that "the yeast cells are strengthened by the soluble nitrogenous matter of the potato, which acts as a yeast stimulant and enables a smaller quantity of yeast to hydrolyze a larger amount of starch. The yeast cells then act very rapidly on the glucose thus produced from the starch and develop the alcoholic fermentation." The proportion of water required to mix with the dough and yeast to form the "sponge" depends upon the quality of the flour, as the gluten flours take much more water than the starchy flours, but enough should be added to make the sponge as moist as can be molded readily with the hands. The dough should be thoroughly kneaded, so that the yeast will penetrate to every part of the mass. It should then be allowed to stand in a warm place, for a proper temperature is an essential condition to the fermenting process. The most favorable temperature is from 70° to 75° F., if it is allowed to rise above 90° acetic, lactic, and possibly other organic acids are liable to form, in other words, the bread sours. If, on the other hand, the temperature is too low, the process of fermentation will not take place. The yeast begins to act upon some of the starch of the flour, changing it to sugar, and then decomposing the sugar into carbon dioxide and alcohol. It is not until the second stage is reached, and the gas begins to form, that the action is visible. After the process has gone on for a time, until the whole mass is honey-combed, the dough should be subjected to a second thorough kneading, to break up the large gas bubbles into many small ones and distribute them evenly through the mass of dough. The thoroughly kneaded mass is next molded

into loaves and allowed again to "rise." As bread loses a portion of its nutritive properties each time it is molded, the process should not be repeated too often. Bread which has been kneaded only once has a sweeter flavor than that molded twice, but its texture is coarser and its appearance less attractive. The loss of nutritive value is from that portion of the starch which is converted into alcohol and gas.

When the bread is thoroughly kneaded the second time, it is ready for the oven after rising. The best temperature for baking bread is from 450° to 550° F., so that the interior of the loaf will be at the boiling point, or 212° F.

moist crumb retains its heat much longer. As gradually, however, its temperature falls to that of the surrounding atmosphere, its moisture tends to pass outward, leaving a comparatively dry crumb and moist crust. Common experience shows that if stale bread is put into the oven for a few minutes it regains something of its fresh consistency—crisp crust and moist crumb. Such bread lacks the elasticity of the fresh loaf, and its interior crumbles as easily as before it was reheated. This is supposed to be because the starch has undergone a chemical change, the nature of which is not yet clearly understood. Indeed, the whole question of stale-

KIND OF BREAD	Water	Protein	Fat	CARBOHYDRATES			Ash
				Starch	Sugar	Dextrn, etc.	
Rye bread (German) {Crumb	46.4	8.9	.6	34.2	1.4	8.3	..
{Crust	12.5	12.3	.6	53.5	4.2	16.0	...
Wheat bread (German) ... {Crumb	40.6	6.5	1.0	40.3	2.5	8.9	...
{Crust	13.0	9.3	.6	59.2	3.6	14.0	...
Wheat bread (American) {Crumb	40.6	8.9	.5		49.7		.3
{Crust	22.3	11.4	.6		65.3		.4

During the process of baking the starch of the flour is rendered soluble by the heat, the fermenting growth is killed, and the alcohol formed by the fermenting action is driven off. The carbon dioxide is also expanded. By wetting the loaves before they are put into the oven, the crust is formed more rapidly, and the too rapid expansion of the dough is checked. Steam is sometimes injected into the oven while the bread is baking, thus glazing the crust and keeping the interior of the bread more moist. Baked bread consists of two portions, the crumb and the crust, which differ from each other both physically and chemically. These differences are due to the more sudden and intense heat to which the crust is subjected. The action of the heat and of the steam rapidly decomposes the starch into dextrin and maltose, which are caramelized by the heat, and so the surface takes on a brown color and a sweeter taste. The accompanying table shows the chemical difference between the crumb and crust of bread, according to the analyses of German and American investigators.

That fermented bread is more healthful than unfermented is the general opinion among physicians. Being porous, it is easily masticated and more thoroughly aerated during the process, so that the starch is more easily acted upon by the digestive fluids.

Good fresh bread has a crisp crust which breaks with a snap, and an elastic crumb which springs back into shape after being pressed with the finger. Before bread is a day old, however, its texture has changed; its crust has become softer and tougher, while the inside seems dry and crumbly; the bread is "growing stale," as we say. This was formerly supposed to be due simply to the drying of the bread; but as the loss of water is found by experiment to be comparatively slight, some other explanation is necessary, and various ones have been offered, of which the most interesting seems that given by Bouteux. He maintains that the apparent dryness is due to a shifting of the moisture from the crumb to the crust. When first taken from the oven the dry crust cools quickly, but the

ness is one about which little has been absolutely proved.

The average percentage composition of a number of common kinds of bread is shown in the following table:

AVERAGE COMPOSITION OF A NUMBER OF DIFFERENT KINDS OF BREAD

KIND OF BREAD	Water	Protein	Fat	Carbohy- drates	Ash
	%	%	%	%	%
Corn bread (johnnycake)	38.9	7.9	4.7	46.3	2.2
Rye bread	35.7	9.0	0.6	53.2	1.5
Rye-and-wheat bread	38.3	11.8	0.3	51.5	1.0
Wheat bread, "graham"	35.7	8.9	1.6	52.1	1.5
Wheat bread, "roll"	29.2	8.0	4.1	56.7	1.1
Wheat bread from high-grade patent flour	32.9	8.7	1.4	56.5	0.5
Wheat bread from regular pat- ent flour	34.1	9.0	1.3	54.9	0.7
Wheat bread from bakers' flour	39.1	10.6	1.2	48.3	0.9
Wheat bread from low-grade flour	40.7	12.6	1.1	44.3	1.3
Wheat bread, average of a large number of analyses	35.3	9.2	1.3	53.1	1.1
Whole-wheat bread	38.4	9.7	0.9	49.7	1.3
Crackers	6.8	10.7	8.8	71.9	1.8

It will be seen that wheat bread from low-grade flour, wheat bread from bakers' flour, and rye-and-wheat bread contain the largest amount of protein; corn bread and wheat rolls, the most fat; and wheat rolls, wheat bread from high-grade patent flour, and wheat bread from regular patent flour, the most carbohydrates. The amount of fat would, of course, vary greatly with the amount of shortening added in making the bread, and the examination of a large number of analyses of the same kind of bread has shown that the amount of each of the several nutrients varies in the same sort of bread within rather wide limits. Judged by their composition, all breads are nutritious foods, and too great stress should not be laid on the variations in composition between the different kinds.

The chemical composition of the finished loaf

differs somewhat from that of the original material, as is shown by the following table, which compares flour and the breads made from it

AVERAGE COMPOSITION OF WHITE BREAD AND OF THE FLOUR FROM WHICH IT WAS MADE

	Water	Protein	Fat	Carbohydrates	Ash
	%	%	%	%	%
Bread	35.3	9.2	1.3	53.1	1.1
Flour	12.0	11.4	1.0	75.1	0.5

The increase of water in the bread hardly needs explanation, since it is evidently due to the water added in making the dough. The use of butter or lard and salt probably accounts for the excess of fat and ash. The decrease in the proportion of protein and carbohydrates is due to the increase in the other ingredients, though a small quantity of each doubtless went to nourish the yeast. Most of the carbon dioxide into which they were converted passed out of the bread. According to Birnbaum the baked bread contains an average of 0.314 per cent of alcohol, by no means all of that generated by the yeast (about 1 per cent according to Snyder), part is evaporated and part is probably changed into acetic acid. The bacteria and other microscopic plants which accompanied the yeast doubtless took their share of the protein and carbohydrates, returning a part in the form of the characteristic acids and other bodies which they produce. Part of the starch in the crust has been changed into dextrin, and that in the crumb has become gelatinous or partly soluble. The gluten has taken definite shape, in other words, it has coagulated very much as the white of an egg does in boiling.

Effect of Baking Powders. Various mixtures of acid and soda called baking powders (qv) are prepared by which carbonic acid may be introduced directly into the dough, instead of awaiting the slower process of fermentation. By this means there is no loss of nutritive qualities in the bread by decomposition, while in fermented bread this amounts to 1 per cent. One of the disadvantages of this method is that in the case of most of the acids used to liberate carbonic acid from soda, the reaction is instantaneous, and much of the gas is dissipated before the bread reaches the oven. Cream of tartar is the only acid substance which does not liberate the gas by simple contact in the cold, it is therefore best adapted to cooking. Another objection to this method of raising bread is that a residue of harmful salts may be left in the bread. Hence it is that the various baking powders on the market should be used with caution. When cream of tartar and soda are put in separately by the cook instead of a baking powder, care should be taken not to use an excess of the former, as the flavor may be injured and the product be unwholesome.

Self-raising Flours are simple flours into which acid and soda preparations have been mixed in such proportions that the addition of water, by liberating the carbon dioxide, produces a spongy dough. Lightness is produced in bread or cake by the simple addition of well-beaten eggs, because the air is caught by the sticky albumen of the eggs and remains imprisoned in

the dough. Air at 70° F expands to three times its bulk when the temperature is raised to 500° F, and the whole mass of dough is expanded with it. If the heat of the oven is too intense when dough thus prepared is placed in it, the bubbles of air will swell so rapidly that they will burst, and the dough will fall.

Besides the ordinary white wheat bread, there are innumerable fancy white breads, breads made from flours other than wheat, and unleavened breads, on the market, which can hardly be more than referred to here. Most like the ordinary bread are the fancy white breads, such as Vienna and French rolls, the milk breads, etc. These usually differ chiefly in the use of milk, sugar, butter, lard, etc., in the dough. Entire wheat, graham, rye, barley, or oatmeal flours are made into bread in essentially the same way as ordinary wheat flour and vary in texture and nutritive value according to the composition of the materials from which they are made.

The original *graham bread*, made without yeast from graham flour according to the recipe of its inventor, and not to be confounded with raised graham bread, is made by kneading the flour and water thoroughly and allowing the dough to stand several hours before baking. It is heavier than ordinary yeast bread, but still is somewhat porous, owing probably to fermentation started by bacteria accidentally present in the flour and acquired from the air, it is sweet and by no means unpalatable, but probably the nutritive value of its protein is lower than Dr Graham supposed.

Gluten bread, if properly made, contains the gluten of the flour, from which more or less of the starch has been removed. To make it, strong flour and water are made into dough, which is pressed and stained under a stream of water until the starch has been worked out, it is then kneaded again and baked. It makes a light, elastic loaf, frequently prescribed for diabetic patients, from whose diet it is considered desirable to exclude starch.

The *acid bread*, so popular in London, is made by a method invented by the English physician Daughish in 1856. According to this method the water used for wetting the dough is directly charged with the requisite amount of carbon dioxide gas and then mixed with the flour in a specially constructed machine. The flour is inclosed in a tight box, moistened with the charged water, thoroughly kneaded by machinery, molded into loaves, and put directly into the oven. The advantages claimed for this form of bread are (1) there is no loss of flour through fermentation, (2) the process is much more rapid, (3) the cost of machinery and gas is less than that of yeast, (4) the process is more sanitary, the bread requiring no handling, (5) the bread is absolutely pure, containing only water, flour, and salt. Sometimes a little fermented barley infusion, or wort, as it is called, from a brewery, is put into the water. This aids it in absorbing the gas, renders the gluten more elastic, and improves the flavor of the bread.

The so-called *salt rising bread* is interesting as an illustration of self-raised bread. In it the ferments originally present or acquired from the air produce the fermentation which leavens it. To make it, warm milk and corn meal are mixed together into a stiff batter, which is left at blood heat until the whole mass is sour, i.e., until the ferments present have produced fermentation throughout. Next a thick sponge is

made of wheat flour and hot water, in which a little salt has been dissolved. This sponge and the sour batter are thoroughly kneaded together and set in a warm place for several hours. The leavening action started in the batter spreads through the dough and produces a light, porous loaf, which many persons consider very palatable. Such bread is quite free from acidity, as the presence of the salt prevents undesirable fermentation.

Various forms of "raised biscuits," "hot bread," etc., are made in the household by adding shortening, milk, eggs, etc., to the dough, or by modifying in some way the process followed. Using soda and cream of tartar, or baking powder, in making biscuits, shortcakes, etc., the process is intrinsically the same as in making ordinary white bread, except that the baking powder or its substitute does the work of the yeast. Such breads do not require to be kneaded or set to rise, and bake very quickly, hence are very convenient when yeast is not obtainable or time is limited. They never become so light and porous as yeast-made bread, however, and dry very quickly.

An interesting variety of bread made without leavening is known as *Maryland* or *beaten* biscuit. A rather stiff dough is made from flour and water, or milk, with shortening and salt added. It is kneaded and then beaten or pounded, being frequently turned over and over until it looks light and puffy. The biscuits are then formed and baked. The folding and pounding of the dough incloses small quantities of air in numberless little blisters. These expand in baking and make the biscuit light and porous. The different kinds of bread from other grains than wheat, as "corn bread," "brown bread," "rye bread," "gems," etc., which are made in many households, vary somewhat in different regions, but they all follow the same principles which govern the bread making from wheat flour, i.e., the flour or meal is mixed to a dough with water or milk, and some leavening substance is generally added to make the dough porous. Eggs, sugar, shortening, etc., may be added, giving rise to the numerous varieties with which we are all familiar.

Digestibility. The digestibility of bread is a very important matter, which has been often studied by methods of artificial digestion and by experiments with man. Among the best known of the latter are those conducted by Meyer and Voit, of Munich. Four kinds of bread were used: (1) rye bread, raised with a leavening powder; (2) bread made from a mixture of rye and wheat flours and raised with yeast; (3) fine white bread raised with yeast, and (4) coarse whole-wheat bread, which the Germans call "pumpernickel," raised with yeast. The third of these—fine white bread—yielded the highest percentage of digestible nutrients; next came the wheat-and-rye bread; then the bread raised with leavening powder, and last, the pumpernickel, which is too coarse to be justly compared with whole-wheat bread such as is made in the United States. The fine white bread was the lightest; next to it stood the rye-and-wheat, and next, that raised with the powder; these breads took the same order with regard to digestibility. These experiments show, not so much the comparative value of different flours, as that the digestibility of bread depends largely upon its lightness.

A number of experiments have been recently made, especially by Snyder, and by Woods and

Merrill, on the digestibility of bread from different grades of flour ground from the same lot of wheat. The average result of a number of such experiments follows:

DIGESTIBILITY OF BREAD FROM DIFFERENT KINDS OF FLOUR

KIND OF FLOUR	Protein	Fat	Carbohydrates	Energy
	%	%	%	%
White bread from standard patent flour	85.3	55.4	97.5	90.1
Entire-wheat flour bread	80.4	55.8	94.1	85.5
Graham bread	77.0	58.0	88.4	80.7

According to the chemical analysis of graham, entire-wheat, and standard patent flours milled from the same lot of hard Scotch Fife spring wheat, the graham flour contained the highest and the patent flour the lowest percentage of total protein. (See WHEAT.) But according to the results of digestion experiments with these flours the proportions of digestible or available protein and available energy in the patent flour were larger than in either the entire-wheat or the graham flour. The lower digestibility of the protein of the latter is due to the fact that in both these flours a considerable portion of this constituent is contained in the coarser particles (bran), and so resists the action of the digestive juices and escapes digestion. Thus, while there actually may be more protein in a given amount of graham or entire-wheat flour than in the same weight of patent flour from the same wheat, the body obtains less of the protein and energy from the coarse flour than it does from the fine, because, although the including of the bran and germ increases the percentage of protein, it decreases its digestibility.

The digestibility of first and second patent flours, as shown by experiments made at the same time as those noted above, was not appreciably different from that of standard patent flour. The degree of digestibility of all of these flours is high, due largely to their mechanical condition, i.e., to the fact that they are finely ground and contain no bran.

Judged by both composition and digestibility, good bread is a wholesome, useful food. As compared with most meats and vegetables, bread has practically no waste and is quite completely digested. It is too poor in protein to be fittingly used alone, but when used with due quantities of other foods, it is invaluable, and well deserves its title of "the staff of life." Statements of a popular nature are frequently met with on the unwholesomeness of hot bread. The fact that bread is hot has doubtless little to do with the matter. New bread, especially that from a large loaf, may be readily compressed into more or less solid masses, and it is possible that such bread would be much less finely masticated than crumbly stale bread, and that therefore it might offer more resistance to the digestive juices of the stomach. However, when such hot bread as rolls, biscuit, or other form in which the crust is very large in proportion to the crumb, is eaten, this objection has much less force. There is little difficulty in masticating the crust, and it is doubtless usually finely divided.

The bran of wheat contains a compound or compounds known as "vitamines," which are

present also in a large number of other food materials and are essential for proper nutrition. It is frequently claimed that because the removal of the bran in milling deprives the flour of this essential ingredient, the finer flours are therefore much less desirable for food than the coarser grades containing the bran. If bread were the chief or only article of the diet, it would be desirable to use the coarser flours, but where a mixed ration of a wide variety of food materials is used, the diet will contain a sufficient amount of the essential ingredient vitamins so that either coarse or fine flour may be used, according to preference.

Imperfections and Impurities in Bread. One of the most common and dangerous faults in bread is heaviness or sogginess. In wheat bread this may be caused by the use of cheap flours, poor in gluten, which cannot absorb all the water put into the dough, or, to state it another way, by the use of too much water in proportion to the flour, by too little or by too poor yeast, or by insufficient kneading, rising, or baking. Heavy bread is popularly considered one of the most indigestible of foods. When chewed, it rolls itself into solid lumps, which give the saliva and gastric juices very little chance to work upon them.

Occasionally the crumb of fresh bread breaks when cut, instead of separating cleanly under the knife. According to Jago, harsh, dry flours, not sufficiently fermented, may be the cause of this, or the dough may have lost its tenacity by being overworked. Another common fault in bread, especially in bakers' bread, is a crumb full of large, irregular holes instead of the small, even pores which it should show. These occur in overkneaded or overraised dough, or if they are found just below the crust they indicate that the oven was too hot and that the crust formed before the carbon dioxide had finished expanding.

Sometimes bread makers are troubled by what is known as "sticky" or "slimy" bread. In such cases bread three or four days old takes on a light-brown color and a peculiar taste and odor. Gradually, too, it becomes sticky or slimy, until it may be pulled into strings, sometimes several feet in length. The trouble appears to be caused by the common potato bacillus (*Bacillus mesentericus vulgaris*), a minute organism which finds its way into the materials of the dough, survives the baking, and, growing in the bread, causes it to decompose.

Recent experiments show that the bacilli enter the bread with the yeast, which in the cases investigated was a variety of the compressed yeasts ordinarily on the market. It was also proved that the bacilli will survive the heat of baking. Accordingly, if yeasts are not carefully made, such trouble may occur at any time, but especially when the weather is warm and favorable to the growth of the bacilli. The best safeguards are to keep the bread in a cool place and to bake only as much as can be consumed within a day or two.

Not infrequently, especially in damp weather, mold forms on the outside, or even in the inside of bread. Mold, like yeast, is a minute plant whose spores (or seeds) are floating about everywhere in the air, ready to settle down and grow wherever they find a moist, suitable material on which to feed. The best practical way to protect bread from them is to keep it in a dry, air-tight box.

But all these faults seem insignificant compared with sour bread. This is due to acetic,

lactic, or, in the worst cases, butyric acid given off by undesirable bacteria, which get into the bread with the yeast or in some other way.

Besides these acid producing bacteria, various others may occur in bread, mostly harmless, but some of them very curious in their effects. Most striking among these is the *Mucococcus prodigiosus*, a minute organism which makes blood red spots in the dough and whose presence gave rise to many interesting superstitions during the Middle Ages.

The adulterants most commonly met with in bread are mineral salts mixed into the dough for the purpose of producing a good looking loaf from poor flour. Alum is the most common of these. Soda is often used in bread to prevent souring, and, as it does not lessen the value, can hardly be called an adulterant. In breads made from special flour, poor in gluten—oatmeal, barley, etc.—soda is regarded as necessary in the production of a sweet, well raised loaf. See also BARLEY, BUCKWHEAT, FLOUR, MAIZE, RICE, etc., WHEAT, ADULTERATION.

For further information consult Jago, *The Science and Art of Bread-Making* (London, 1895), W. Jago and W. C. Jago, *The Technology of Bread-Making* (Chicago, 1911), Church, *Food Grains of India*, with supplement (London, 1901), Bouteux, *Le pain et la panification* (Paris, 1897), Goodfellow, *Dietetic Value of Bread* (London and New York, 1892), Roei, *Bread and Bread-Making* (Philadelphia, 1899), Von Bibra, *Die Getreidearten und das Brod* (Nuremberg, 1861), Section on Bread-Making, Richards, *Chemistry of Cookery* (Boston, 1894), Abel, *Practical Sanitary and Economic Cookery* (Rochester, 1890), Sadler, *Organic Chemistry* (Philadelphia, 1900), United States Department of Agriculture, Office of Experiment Stations, *Bulletins Nos. 35, 52, 67, 85, 101, 126, 143, 156, 200, and 202*, United States Department of Agriculture, *Farmers' Bulletin No. 389, Grant, Chemistry of Breadmaking* (London, 1912), Wood, *Story of a Loaf of Bread* (New York, 1913).

BREADFRUIT TREE, *Artocarpus incisa*
A tree of the family Moraceae, a native of the islands of the Pacific Ocean and of the Indian Archipelago. It is one of the most important natural products of these regions, its fruit supplying food, and its inner bark a material for making clothing, while its timber and its milky juice are also employed for economic purposes. The breadfruit tree is a rather slender tree, 40 to 50 feet high, often rising almost half its height without a branch. It has large pinnatifid leaves, frequently 12 to 18 inches long, dark green, and glossy. The fruit is generally oval, or nearly spherical, and about the size of a child's head. It is a sorosis, a compound or aggregate fruit formed from numerous flowers on a common axis, and is covered with a roughish rind, which is marked with small square or lozenge-shaped divisions, having each a small elevation in the centre. It is at first green, when imperfectly ripened, it is brown, and when fully ripe assumes a rich yellow hue. It is attached to the small branches of the tree by a short thick stalk and hangs either singly or in clusters of two or three together. It contains a somewhat fibrous pulp, which, when ripe, becomes juicy and yellow, but has then a rotten taste. At an earlier stage, when the fruit is gathered for use, the pulp is white and mealy and of a consistence resembling that of new bread. In a still less mature state the fruit

contains a viscous white milk. The common practice in the South Sea Islands is to cut each fruit into three or four pieces and take out the core, then to place heated stones in the bottom of a hole dug in the earth, cover them with green leaves, and upon this to place a layer of the fruit, then stones, leaves, and fruit alternately, till the hole is nearly filled, when leaves and earth to the depth of several inches are spread over all. In rather more than half an hour the breadfruit is ready; "the outsides are, in general, nicely browned, and the inner part presents a white or yellowish cellular pulpy substance, in appearance slightly resembling the crumb of a wheaten loaf." It has little taste, but is frequently sweetish and more resembles the plantain than bread made of wheat flour. It is slightly astringent and highly nutritious. Sometimes the inhabitants of a district join to make a prodigious oven—a pit 20 or 30 feet in circumference, the stones in which are heated by wood burned in it, and many hundred breadfruits are thrown in and cooked at once. Baked in this manner, breadfruit will keep good for several weeks. Another mode of preserving it is by subjecting it in heaps to a slight degree of fermentation and beating it into a kind of paste, which, although rather sour, is much used when fresh breadfruit cannot be obtained. There are numerous varieties of breadfruit tree in the South Sea Islands, and they ripen at different seasons, the most highly prized being seedless. The tree produces two, and sometimes three, crops a year. In the West Indies and South America, into which it has also been introduced, the breadfruit has not come much into use as an ordinary article of food, but various preparations of it are reckoned delicacies. The fibrous inner bark of young breadfruit trees, beaten and prepared, is used for making a kind of cloth, which is much worn by the common people in the South Sea Islands, though inferior in softness and whiteness to that made from the paper mulberry. There exudes from the bark of the bread tree, when punctured, a thick, mucilaginous fluid, which hardens by exposure to the air, and is used, when boiled with coconut oil, for making the seams of canoes, pails, etc., water-tight, and as birdlime. The timber is soft and light, of a rich yellow color, and assumes, when exposed to the air, the appearance of mahogany. It is used for canoes, house building, furniture, and many other purposes. It is durable when not exposed to the weather. The jack tree (q.v.) or *jaca* (*Artocarpus integrifolia*), and the daphal (*Artocarpus Lakoocha*), both large East Indian trees, belong to the same genus with the breadfruit tree.

BREAD NUT. The fruit of *Brosimum alicastrum*, a tree of the family Artocarpaceae, and therefore allied to the breadfruit, a native of Jamaica. The genus *Brosimum* is distinguished by male and female flowers on separate trees, in globose catkins. The fruit is a one-seeded drupe. The bread-nut tree abounds in a tenacious, gummy milk which contains rubber. The nuts, boiled or roasted, form an agreeable article of food. Their taste resembles that of hazelnuts.

BREAD-ROOT. See PSORALEA.

BREADTH. The term in art which denotes the quality through which grandeur and simplicity of effect are obtained. In painting, when the play of light upon an object, a group of objects, or a scene, is so managed that the effect is direct and carrying, the work is spoken of as

possessing breadth. Mere outline does not so much contribute to this result as do light and shade and color. It is arrived at often through the suppression of unnecessary detail; still, finish does not preclude, or negligence produce it. Its secret is intelligent vision, and the truthful recording of seen things. Rembrandt in portraiture is a good exemplar of this quality of breadth. Critics of painting often speak of an artist as having a broad touch. This is not close enough to define the meaning of breadth in a large sense, the painter must also possess breadth of vision. Sculpture, too, demands this quality of breadth, and it is achieved in modeling by producing such forms that the light in striking a plastic mass is not so broken by petty forms as to destroy the simplicity and dignity of a figure or group of figures as a monumental whole. The human mind, indeed, is distracted and disturbed, unconsciously, perhaps, in contemplating a so-called work of art in which this quality does not exist.

BREAKBONE FEVER. See DENGUE.

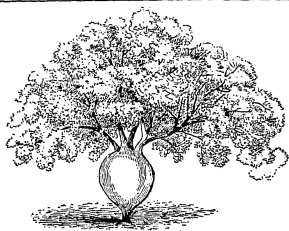
BREAKER. A wave of which the surface is broken, usually by the nearness of the bottom to the water surface. A wave which is of little height in deep water will often increase in height as the depth lessens and finally break into foam. Shoals are invariably covered with breakers in heavy weather, and a very moderate swell will break over rocks or shoals which are only a few feet below the surface. The calls *breakers ahead*, *on the lee bow*, *on the starboard bow*, etc., indicate that breaking waves are seen in the direction indicated, breakers often serve as a warning of a shoal which might be unnoticed in a very smooth sea. Small casks, of oval section, which are used for carrying fresh water in boats, are called *water breakers*.

BREAKERS. See CRUSHING AND PULVERIZING MACHINERY.

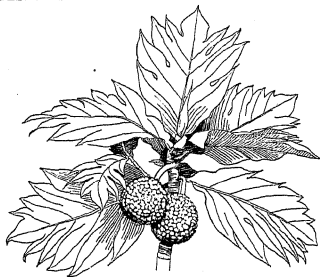
BREAKING BULK. A willful breaking open of a package, bundle or box of chattels, and the appropriation of the contents thereof to the uses of the person who breaks it open in such a manner as to amount to a conversion or other violation of the rights of the owner. At common law, a bailee who received goods inclosed in a box or a package was not liable for trespass or theft if he sold the box or package together with its contents; but if he broke open the box or package and sold a part or all of the goods, he was criminally liable. This distinction was based on the theory that the bailor delivered possession of the box or package to the bailee, but not of the goods inside. Hence, when the bailee sold and delivered the box or package there was no wrongful taking from the possession of the bailor but only when he broke open the box or package and disposed of the contents which had not been delivered into his possession. Modern legislation in England and the United States has abolished this distinction, and has declared the fraudulent conversion of the bailor's goods by the bailee to be larceny (q.v.), whether attended by breaking of bulk or not. See BREACH; LARCENY; CONVERSION; SALE; and consult the authorities there referred to.

BREAK-WATER. A barrier of solid construction built out into the open sea or a lake to break the force of the waves and to provide comparatively smooth water inside for the anchorage of vessels or their landing at piers. Some of the great harbor cities of the world, such as New York, Boston, and San Francisco

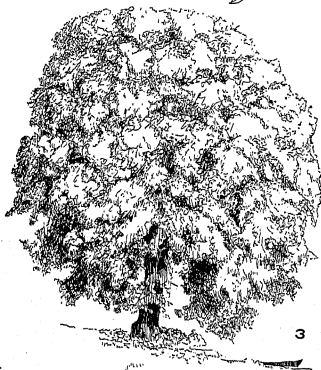
BREADFRUIT, BANANA, ETC.



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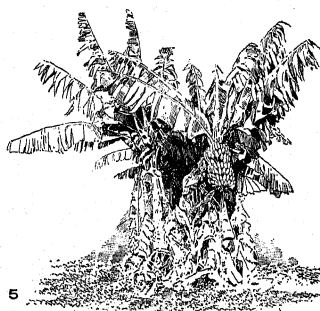
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1. BOTTLE TREE (*Sterculia rupestris*).
2. BREADFRUIT (*Artocarpus incisa*).

3. BRAZIL NUT TREE (*Bertholletia excelsa*).
4. BREADFRUIT TREE.
5. BANANA (*Musa sapientum*).

in the United States, are on large bays or estuaries so protected by the natural conformation of the land that the heavy waves of the open sea never enter, these are natural harbors, and the cities so located easily reached their important position as ports primarily on account of the ease of access and safety in the anchorage naturally afforded shipping. Other lake or sea-coast cities are situated on open water, but for various economic and geographic reasons have become ports, for these some artificial protection against the force of the waves must be provided.

The use of breakwaters dates back to the earliest days of civilization. The Greeks were proficient in their construction, and they are described in some detail by Vitruvius, the Roman writer on architecture and engineering, and even enter, somewhat ambiguously, into the poetry of Vergil. The earliest use in modern times is the mole or breakwater at Cherbourg, France, which was begun in 1786. In Europe and Asia their use has been somewhat more extensive than in the United States, mainly because the American coast abounds in good natural harbors, but on the Great Lakes of America the design and construction of breakwaters have reached a high development.

The breakwater should be distinguished in its essential elements from the jetty, with which it is often confused. A jetty (qv) is a barrier (generally one of two parallel barriers) built at the mouth of a river in such form as to induce the river currents to scour the bottom of the harbor and remove from the channel there the sand, silt, or earth that is carried down by the river. Breakwaters are intended merely to break the force of the waves, although in occasional instances they serve also as jetties, which accounts for the confusion in terms.

Harbors created by breakwaters are of three classes—those located at the mouth of a river or bay on which is located the city for which the harbor is built, those located on a naturally unprotected shore so that the piers and docks of the port are directly within the breakwater, and harbors of refuge.

This distinction has very little to do with the design of the breakwater, and in fact a number of instances can be cited where the first two types,

at least, are combined. The purposes of the three are, however, somewhat different. A river entering a larger body of water sets up in that larger body a confusion of cross currents very dangerous to navigation, and at the same time the rush of the waves into the funnel-shaped mouth of the river produce there equally dangerous conditions. To reduce these currents and waves to navigable proportions barriers, called breakwaters, are thrown out from either side of the river mouth to within a short distance of one another, leaving an opening through which ships may enter from the rough outer water into a safe inner harbor sufficiently large to take up the effect of the river current and at the same time protected from the outer waves by the breakwater. In some cases these breakwaters serve as jetties. This, however, is, as a rule, a primitive use of the breakwater, for in modern practice the accumulated silt and sand is generally removed by dredging. There is a type of construction sometimes known as a "reaction breakwater," which should more properly be called a "reaction jetty," which is intended to perform the double function of a breakwater and a jetty. It is a single linear structure designed to oppose a portion of the flood tide, and at the same time, from its peculiar curvilinear plan, to produce interfering waves which deposit sand outside of the channel protected and to reflect the ebb tide so as to produce a reaction tending to lower any sand bar across the mouth of the channel.

The second type of breakwater noted above forms a harbor on a generally straight shore line. Within its confines are the usual pier and docks of a port. Its sole purpose is to oppose the force of the waves. A breakwater may shelter a harbor of a different type from either of the two noted above, i.e., a harbor of refuge. This is a roadstead for the temporary anchorage of vessels that need shelter from storms. Such a breakwater is the one at Sandy Bay, Cape Ann, Mass., and the breakwater at the mouth of Delaware Bay, shown in Fig. 6.

The classification of breakwaters given above is according to their purpose. A further classification according to location may be made into connected, detached, and island breakwaters. These are shown in their simplest forms in Fig. 1

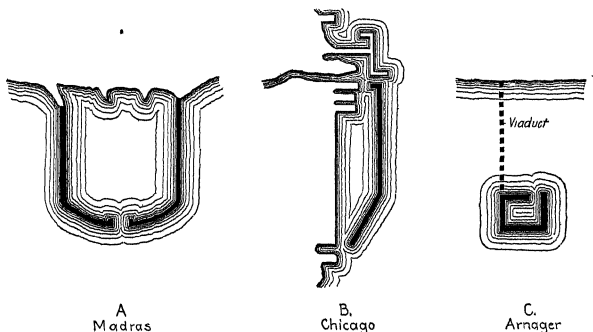


FIG. 1. DIAGRAM SHOWING DIFFERENT TYPES OF BREAKWATERS CLASSIFIED ACCORDING TO LOCATION, A, connected, B, detached, C, island

A connected breakwater is one that juts out from the shore, as in *A*, Fig. 1; a detached breakwater one that is entirely disconnected from shore, as in *B*, and an island breakwater one that forms an island of water connected to the mainland by a bridge or viaduct, as in *C*. The first and second are quite similar in design, peculiarities in sea-floor contour and land topography governing the selection. The island harbor, however, has been built in only rare instances because the difficulties in construction and its inaccessibility to shore outweigh the advantages of a smooth harbor which can be built with a minimum of material and removed from the sediment-bearing waves of the shore line.

The design of breakwaters is largely empirical, based on the behavior of certain types of construction in the past. The structures have to be built in the open sea, in peculiarly exposed positions subject to the enormous force of the ocean or lake waves. The stresses to which they are subjected are therefore not susceptible of mathematical analysis except in the most general way. The three factors to be decided upon in any breakwater are the location, the type of structure, and the size of section. As to location, a breakwater is so placed as to afford the maximum protection to the type of shipping which the harbor draws, and this location depends upon the channel, the prevailing winds, and the depth of water. The types of structure are numerous; they are discussed below. The dimensions of the section are governed by the prevailing height, length, and force of the waves, all of which depend upon the fetch (the length of open sea outside the breakwater), the depth of water, and the character of the bottom. The height also varies with the amount of protection required immediately inside the breakwater. Thus, in a harbor of refuge, where the vessels may anchor far back from the breakwater, a certain amount of water breaking over the barrier is of minor importance. In a small fishing harbor, on the contrary, the vessels often tie up immediately alongside the breakwater, in which case breaking waves are undesirable.

The determination of wave condition is largely empirical, being based on observed conditions in the harbor in question or in similarly disposed harbors. An approximate value may be obtained by the application of mathematical formulas, the most important of which is that devised by Mr. Thomas Stevenson, the famous English engineer of the last century. This formula is that the height of waves, in feet, from crest to trough is equal to one and one-half times the square root of the "fetch" in nautical miles, where the conditions are favorable with regard to depth for wave development, and the time during which the storm lasts is sufficient for the production of waves of maximum force.

In regard to the force and height of waves, it is recorded that at Peterhead Breakwater, England, in a storm in 1808, blocks weighing upward of 41 tons were displaced at a level of 36 feet 7 inches below low water. It was computed that this required a wave force of fully 2 tons per square foot. At Colombo, Island of Ceylon, a length of wall 24 feet wide, founded 20 feet below low water (tide rise, 2 feet), was canted inward to an extent of 15 inches over 150 feet of length. At the Bishop Rock Lighthouse, Scilly Isles, after a gale, sand from a bottom 150 feet deep was found on a gallery 120 feet above the water. These are a few

instances of what the masses of stone must withstand under extreme conditions. Pressures due to impact of high waves have been measured by dynamometers. For waves 10 feet high, pressures of 1800 to 3000 pounds per square foot have been observed, while for 25-foot and 30-foot waves the pressures have risen as high as 7000 pounds per square foot.

The profile of the breakwater section has varied from the rectangular timber crib to the approximately circular surface (see Fig. 5), in the effort to produce the greatest obstruction to the waves with the least destructive effect upon the structure. No pronounced standard of section has been generally accepted in practice, although it is admitted that the sloping face on the sea side is preferable. The various structures shown in the accompanying cuts illustrate the trend of profile design. The following conclusions as to shape, by Col. D. D. Gaillard, U. S. A., are representative of current engineering opinion. (a) A sloping-face breakwater with vertical back wall, located in water less than 30 feet deep, will afford sufficient protection to the area in the rear, provided its height above water during storms is not less than two-thirds the height of the greatest waves that assail it; (b) unless the height and top width of the breakwater are unduly great, so much water will pass over the top during severe storms that it would wash completely over the decks of vessels alongside the breakwater. (c) Both the vertical and sloping-face breakwaters will reflect waves, provided the height is sufficient, even although the angle of slope with the horizontal is as small as 23°.

The different types of breakwater construction may be classified as (a) timber crib; (b) timber crib with masonry deck; (c) rubble mound; (d) stone or concrete block and mass concrete; (e) hollow concrete crib. These will be briefly described, with examples of each.

The timber-crib type is the simplest form of breakwater, used now only in minor harbors or under primitive conditions. It was the type universally adopted for the first breakwaters on the Great Lakes, where the lack of natural harbors early required artificial protection. It consists essentially of a series of timber cribs, made up on shore of hewn logs and floated into place above a prepared footing, onto which they were sunk by filling with riprap stone. These cribs were generally built from 30 to 35 feet square, divided into compartments by transverse and longitudinal walls, the cribs being sunk side by side along the line of the proposed breakwater. On top of these filled cribs was built a continuous timber superstructure, generally carried up to a height of about 7 feet above lake level and then decked over. For heavy-sea work the form of the superstructure was changed so as to make the outer part or parapet about 12 feet high and the inner part, or banquette, about 5 feet. Fig. 2 shows a section through the breakwater at Presque Isle, Mich., typical of this type.

These timber breakwaters had the advantages of simplicity in construction and cheapness and availability of material, but they had a very short life. The above water timber soon decayed, and the cribs were easily damaged and destroyed by sand and ice erosion and by the wedgelike action of the small stone filling moved by the force of the waves. Their average life was about 15 years.

An improved modification of this type was made in the East breakwater at Cleveland, Ohio. This was carried up vertically for only 2 feet above water level and was then inclined at an angle of 1 on 2.5 until it attained a height of 10 feet above the water surface on the lake side.

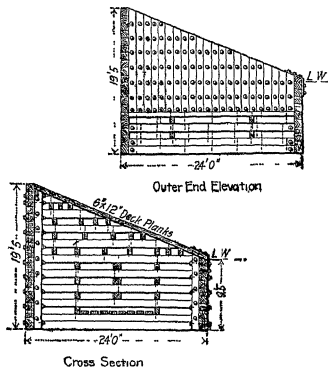


FIG 2 PRESQUE ISLE BREAKWATER, LAKE SUPERIOR

From that point it was horizontal until it met the harbor face, which was vertical. All the decking was made of 12-inch timbers instead of planks, and iron straps were added on the lake-side lower edge to prevent too rapid erosion there. This sloping and smooth face presented a surface up which the storm water slid with much less damage to the structure than in the original crib structures, and the general shape has been adopted for the masonry types noted below.

The next improvement on the Great Lakes

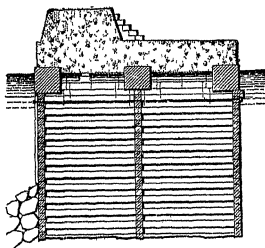


FIG 3 CLEVELAND (OHIO) BREAKWATER, LAKE ERIE

was the composite breakwater, first used at Oswego, N. Y. This consisted in substituting a superstructure of cut stone laid up in cement mortar for the former timber superstructure. It was found, however, that the foundation afforded by the comparatively flexible timber cribs was so poor that the cut-stone masonry was soon shaken to pieces. The substitution of

a solid concrete superstructure was then attempted and was found more stable, and this has been adopted in a number of ports, notably at Cleveland and Buffalo. In preparing this type the cribs are cut off about 3 feet below mean water, and concrete blocks about 4 feet wide,

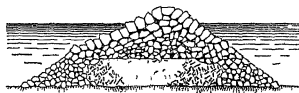


FIG 4 A SIMPLE RUBBLE MOUND BREAKWATER. A CLEVELAND BREAKWATER

4 feet high, and 8 feet long are prepared and placed upon the top of the walls of the crib. The small stone filling is then carried up to within a few inches of the top of the blocks, and upon this the surface of mass concrete is molded in place across the full width of the crib. In the Cleveland breakwater, shown in Fig 3, the mass concrete of the banquette is 5 feet thick, the parapet 5 feet high, and the concrete mass blocks alternately 20 and 30 feet long, separated by a tar-paper joint. This type is much more stable than the ones previously described, but there is still a movement of the superstructure, and in most cases the further protection of riprapping is required. In the later developments of these types they are not founded on the bottom, but on sloping mounds



FIG 5 PLYMOUTH (MICH) BREAKWATER

of riprap dumped into place, or on piles, thus insuring a more stable foundation against the undermining force of the waves.

A radical change from the timber-founded types is the rubble mound breakwater, which is the one most generally used in the exposed locations where wave force is very great. This consists essentially in first building up, by dumping from trestles or barges, a mound of small stone to somewhat below water level, and then dumping upon this at random large blocks of stone so that the whole forms a generally trapezoidal section. There are many variations of this type, but the section in Fig 4 of another of the Cleveland breakwaters will serve to illustrate the general design. The advantages of the

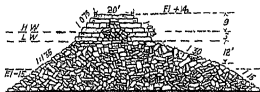


FIG 6 NEW DELAWARE BREAKWATER

type are that they are comparatively simple to build, and that any repairs consist merely in dumping more stone on top of the mound to replace that forced over on the slopes by the waves. In time the mound will take a permanent section, and repairs are slight. The main

disadvantage is the great amount of stone that has to be used, and the comparative roughness of the inner harbor due to lack of sufficient barrier above water.

To avoid this latter difficulty, the block breakwater is used. In this type a superstructure of out stone or mass concrete is placed on the under-water riprap structure. These upper stones may be placed in different fashion, as is illustrated in Figs. 5 and 6, which show the

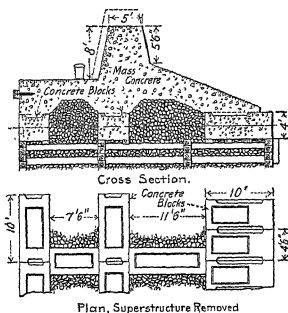


FIG. 7. A CONCRETE-BLOCK BREAKWATER, HARBOR BEACH, MICH.

block breakwaters at Plymouth, England, and at the mouth of Delaware Bay. Occasionally the improvement consists merely in paving the sea face of the breakwater with large stone blocks.

An improvement of the masonry type is the use of concrete blocks instead of stone. These blocks are cast on shore and are placed with precision on the rubble mound. Their advantage lies in the ability to easily make bonds in the blocks so that they may be tied together in the superstructure as a solid mass. Illustrations of the type are shown in Fig. 7.

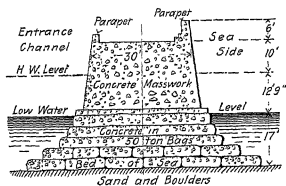


FIG. 8. A SOLID CONCRETE BREAKWATER, ABERDEEN, SCOTLAND.

Another variation is the use of a solid concrete superstructure cast in place in the breakwater, either on pile footings or on a rubble mound. The disadvantage of the block type is the high cost; the main advantage the relative permanence of the construction.

The latest type of concrete breakwaters are those made of hollow concrete cribs, molded on shore, floated to place in the line of the breakwater, there to be sunk by filling with riprap, and decked with a continuous concrete decking. This, it will be observed, is precisely the same principle as that used in the primitive timber cribs, except that the more durable concrete is substituted for wood. Their principal application to American practice has been at Algoma

STATISTICS OF NOTABLE BREAKWATERS

Location	Style of breakwater	Greatest continuous length Ft.	Depth at low water Ft.	Total height Ft.	Width of base Ft.	Width of top Ft.	Cost per Ft. \$	Total cost of construction \$
Plymouth, Eng.	Rubble mound, capped with granite, laid in conc.	5,100	32.5	55	380	65	1,470	7,500,000
Portland, Eng.	Rubble mound	6,400	62.5	73	345	65	655	4,102,000
Tees, Eng.	Rubble mound	12,810	13	46	221	51	00	.....
Algiers	Rubble and concrete block mound	.....	105.	.....	235	46	615	.....
Alexandria, Egypt	Rubble and concrete block mound	9,975	26	40	100	43	1,034	10,000,000
Marseilles, France	Rubble and concrete block mound with slight superstructure	11,930	56	80	257	110 M'nd	500	6,000,000
Cherbourg, France	Rubble mound and superstructure founded at low water	12,178	50	73	320	50 Sup't'r 30	1,098	13,372,500
Holyhead, Eng.	Rubble mound with superstructure founded above low water	7,860	41	72	408	50 M'nd	816	6,425,000
Genoa, Italy	Sorted rubble mound and superstructure concrete	.....	50	84	316	41 Sup't'r 40 M'nd	640	.....
Alderney	Sorted rubble mound and stone superstructure	4,580	123	154	480	02 Sup't'r 35 48	1,175	6,345,000
Dover, Eng.	Upright wall stone and con.	.....	37	75	60	45	1,616	.....
Buffalo, N. Y.	Rubble mound capped and crib work (conc. capping)	10,000	30	42	150	14	125	1,637,000
Delaware, U. S. A.	Rubble mound capped with stone	8,040	29	44	136	20	217	1,746,000
San Pedro, Cal.	Rubble mound with stone superstructure founded at low water	8,500	43	62	130	20	285	2,901,000
Sandy Bay, Mass.	Rubble mound with stone superstructure founded below low water	9,200	50	72	205	20	361	6,828,000

Harbor, Wis A cross-section of this is shown in Fig 9

It should be stated that there are many technical problems connected with the design of breakwaters which cannot be entered into here, but for information concerning which the authorities at the end of this article should be

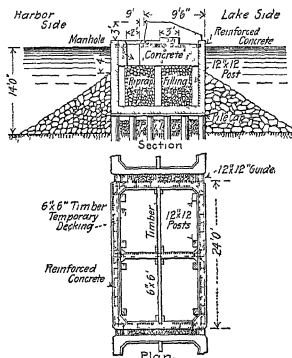


FIG 9 A CONCRETE-CRIB BREAKWATER, ALGOMA, WIS

consulted. These problems relate mainly to the shape of the cross-section, the location of the breakwaters, the proportion and location of the different sizes of stone in the rubble and block types, and the precise effect of the wave force on the structure. The accompanying table, taken from one prepared by Gen Theodore L Bingham, U S A, when he was in active service in the Corps of Engineers, gives data on some of the large breakwaters of the world.

Bibliography No one book contains very recent or complete information on breakwaters. The best data are available in the reports of the Chief of Engineers, U S A, the *Proceedings of the American Society of Civil Engineers*, the *Minutes of Proceedings of the Institution of Civil Engineers*, *Engineering News* (New York), *Engineering Record* (New York), *Engineering* (London), and *Engineer* (London), all current. In addition the following books may be consulted: Vernon-Harcourt, *Harbors and Docks* (London, 1885), Cunningham, *Harbor Engineering* (London, 1908), De Caidmog, *Les ports modernes* (Paris, 1900), Schulze, *Seehafenbau* (Berlin, 1911-13). See HARBOR, JETTY

BRÉAL, bré'AL, MICHEL JULES ALFRED (1832-) An eminent French philologist, born at Landau (Rhenish Bavaria), of French parents. He was educated at Weissenburg, Metz, the Lycée Louis-le-Grand (Paris), and Berlin, where he studied under Bopp. In 1864 he was appointed professor of comparative grammar at the Collège de France, in 1875 was elected to the Academy of Inscriptions and Belles-Lettres, and from 1879 to 1888 was an inspector general of higher education. In 1890 he was elected commander of the Legion of Honor. His publications include *L'étude des origines de la religion Zoroastrienne* (1862),

which obtained the prize of the Academy of Inscriptions, *Le mythe d'Œdipe* (1864), a valuable translation of Bopp's *Vergleichende Grammatik*, with learned historical and critical introductions (5 vols, 1866-74), with A Bailly, a *Dictionnaire étymologique latin* (1885, 5th ed, 1902), *Pour mieux connaître Homère* (1906), *Deux études sur Goethe* (1898). Bréal is generally considered the founder of the modern science of semantics or semiology. At least, his *Essai de sémantique* *Science des significations* (Paris, 1897, 3d ed, 1904) was the first work to treat systematically and scientifically the development of meaning of words. An English translation was made by Mrs Cust (London, 1900), with a preface by Postgate.

BREAM (ME *bream*, OF *brasme*, OHG *bralsuna*, *bralsuna*, *bream*) A name applied to a variety of fishes belonging to different families. The common English bream, or carp bream (*Abramis brama*), is a member of the Cyprinidae family, and an inhabitant of many rivers and lakes of Europe, even as far north as Norway and Sweden, and of some of those of England and Ireland. It thrives best in still water, and many grow to a weight of 6 to 12 pounds. The white bream (*Abramis albus*) differs from the common bream in its silvery color, in its smaller size, and in several structural details. It also occurs on the Continent and in England. These fishes are favorite objects for quiet angling in England, and the carp bream was descanted upon at a great length by Isaac Walton. In America a minnow, the golden shiner (*A. chrysoleucus*), and a sunfish, the pumpkin seed (*Eupomotis gibbosus*), are commonly called "breams" in the Eastern States. (See MINNOW, SUNFISH.) Several species of porgies (*Sparidae*) also receive the name. See PLATES OF CARPS AND ALLIES, and DARTERS AND SUNFISH.

BREAST (AS *brōst*, Goth *brusts*, Ger *Brust*, so called from its swelling protuberances, cf AS *berstam*, Eng *bust*). One of the two lacteal glands situated on a woman's chest. The male also possesses mammary glands and nipples but in a rudimentary form. A breast consists of a series of tubes, radiating from a common center, the nipple, which is situated in an areola, a pink or dark-colored, nearly circular, area. On the surface of the latter are from 4 to 10 sebaceous glands, which secrete an oily fluid to protect the skin of the nipple, which is very thin, from the saliva of the sucking infant. The milk tubes (15 or 18 in number) enlarge into sinuses and pass each to a separate lobe or subdivision of the breast, where they divide into twigs and branches (the *lactiferous ducts*), which end in minute vesicles. The lobes are held together by fibrous tissue, and are well packed in fat, which increases sometimes to an enormous extent the apparent size of the organ. It will be readily understood how overdistention of these delicate tubes, from whatever cause, must be productive of great suffering. Such a condition often arises during the nursing period, from overactivity of the gland combined with deficient emptying, and is known as "caked breast." This may progress to inflammation (mastitis) or abscess formation. When an abscess forms in the breast it is dangerous to allow the pus to remain, and when an opening is made into the abscess the incision should radiate from the nipple, so as to avoid division of the milk tubes. Besides in-

inflammatory affections, the female breast is also subject to tumors. See TUMORS.

BREASTBONE. See STERNUM.

BREASTED, JAMES HENRY (1865-). An American Orientalist, born at Rockford, Ill., and educated at Northwestern College, Chicago Theological Seminary, and Yale. For a number of years he was connected with the departments of Egyptology and Semitic languages at the University of Chicago, and in 1905 was appointed professor of Egyptology and Oriental history; he also became director of the Haskell Oriental Museum of the University of Chicago in 1901. One year (1900) he spent, by commission of the four royal academies of Germany, in copying and arranging the Egyptian inscriptions possessed by the museums of Europe; these were then to be used in preparing the Egyptian dictionary. In 1905-07 he was director of the University of Chicago Egyptian expedition. Besides acting as associate editor of the *American Journal of Semitic Languages* and of the *Biblical World*, and contributing to various foreign scientific journals, he wrote: *A New Chapter in the Life of Thutmose III* (1900); *Ancient Records of Egypt* (5 vols., 1905); *A History of Egypt* (1905; 2d ed., 1909); *The Temples of Lower Nubia* (1906); *A History of the Ancient Egyptians* (1908); *The Monuments of Sudanese Nubia* (1908).

BREAST-PLATE. In ancient and mediæval armor, a plate of iron, steel, or other metal worn to protect the breast. At the end of the twelfth century the breastplate made its appearance in mediæval armor, as a thin plate of iron worn under the gambeson (q.v.). The custom of wearing it above the other defensive armor began in the thirteenth century and was developed in the fourteenth. The backplate, in like manner, was worn as a protection for the back. In modern armies the breastplate is represented by the front half of the cuirass worn by the cuirassiers in continental armies and by the Life Guards and Horse Guards in England.

BREAST-SUMMER, or BRES-SUMMER. A beam or "summer" (q.v.) supporting the whole front of a building, in the same way in which a lintel supports the portion over an opening. They are seen in England and on the continent of Europe, in old houses built partly of wood and partly of stone, brick, or mud.

BREAST WHEEL. See WATER WHEEL.

BREAST-WORK. See FORTIFICATION, and TRENCH.

BREATH (AS. *brath*, odor, smell, exhalation, OHG. *brâdm*, Ger. *brodem*, vapor, steam, exhalation), **OFFENSIVE.** The foul odor of breath may be due to a variety of causes, the most important being as follows: 1. *Digestive disturbance with constipation.* A purge should be used, repeating till the tongue is clean. Indigestible food, as well as beer and distilled liquors, should be avoided, especially if gas be produced in the stomach. 2. *Carious teeth.* 3. *Food fermenting in the mouth.* All cavities should be filled. Food should be picked from between the teeth carefully after each meal and the mouth thoroughly rinsed. The teeth should be brushed morning and evening. 4. *Catarrh of nose,* especially the disease called "ozena," which gives rise to a penetrating and offensive odor, due to the activities of a specific bacillus; warm nasal douches will help this condition, but treatment should be intrusted to a physician. Adenoid vegetations, especially in children, some-

times give rise to foul breath; and chronically diseased tonsils frequently harbor in their crypts small masses of fetid material which has the same effect. Dead bone or dead cartilage (generally the result of syphilis) in the nasal cavity causes a most offensive odor, and removal is the only treatment. Abscess in the socket of a tooth or in the soft tissues of the mouth must be relieved by a dentist or surgeon. 5. An intensely fetid breath is characteristic of gangrene of the lungs, fetid bronchitis, bronchiectasis, pulmonary actinomycosis, old abscesses of the lungs, and the various forms of stomatitis. Certain diseases produce an odor of the breath peculiar to themselves. Uremia gives an ammoniacal odor to the breath; *diabetes mellitus* gives rise to a heavy sweetish odor; cancer of the stomach, intestines, or of the air passages produces a foul-smelling breath, as does diphtheria. In children intestinal worms are a cause.

Many drugs communicate their odor to the breath. Familiar examples are ether, chloroform, tobacco, and alcohol. The heavy narcotic smell of opium, the garlicky odor of phosphorus poisoning, and the smell of peach kernels in hydrocyanic acid poisoning are well known to physicians.

BREATH'ING. See RESPIRATION.

BREBEUF, brâ'bêf, JEAN DE (1593-1640). A Jesuit missionary. He was born at Bayeux, northern France, March 25, 1593, and was killed in the Huron country, March 10, 1640. He came to America with Champlain in 1626, and his labors were mainly among the Hurons, with whose life and language he was very familiar. When the town of St. Louis was taken by the Iroquois, Brebeuf and Lalemont, his associate, were made prisoners and tortured to death. It is said that Brebeuf's skull is preserved in the pediment of a silver bust in the convent of the hospital nuns in Montreal. Some of his writings on the Huron language are preserved, and were translated by Albert Gallatin and published in the *Memoirs of the American Antiquarian Society*, and some of his letters by Carayon (Paris, 1870). Consult his account in the *Jesuits' Relations*, ed. Thwaites (Cleveland, 1896-1901). Consult also Parkman, *Jesuits in North America* (Boston, 1835).

BRECCIA, brê'châ (It. fragments of stone; cf. Fr. *brèche*, Eng. *breach* and *break*). In petrography, a mass composed of angular fragments of rocks cemented by mineral material. The angular fragments may consist of any kind of rock, such as sandstone, limestone, granite, or gneiss, or, as sometimes happens, of a mixture of different kinds. The cementing material is commonly quartz, calcite, iron oxide, or a clayey substance. A breccia may be formed in a number of ways: (1) in the same way as a conglomerate (q.v.), except that the fragments are not rounded by water; (2) by the breaking of a rock into angular fragments by dynamic action, with subsequent cementation; (3) angular blocks may be thrown from volcanoes, which, after falling, become consolidated; (4) the surface of a lava flow may harden, break into angular fragments, and be engulfed in the soft magma beneath, which on cooling yields a breccia; (5) in the intrusion of igneous rocks (q.v.), angular fragments broken from the walls may be caught in the molten mass of the intruded material; (6) some breccias have been formed by cementation of the loose angular frag-

ments of talus slopes or scree See EROSION, TALUS

BRÈCHE DE ROLAND, bièsh de rô'lan' (Fr Roland's Breach). A defile in the Pyrenees forming a passage between France and Spain, at the Crique de Gavarnie, a few miles west of Mont Peidu. According to the legend, Roland made the cleft in the rock with his sword Durandal in the fight at Roncesvalles. The pass is about 200 feet wide and has an elevation of 9000 feet.

BRECHIN, brêch'n A town of Pforzshire, Scotland, on the South Esk, $7\frac{1}{4}$ miles west of its junction with the sea at Montrose (Map Scotland, F 3). Its chief architectural feature is a massive round tower of a character frequently met with in Ireland, but quite uncommon in Scotland. It is 86 feet high, and 16 feet in diameter at the base, and surmounted by a hexagonal spire 18 feet high which was added in the eighteenth century. It was built about 1000. The town is well lighted and has an excellent water supply. The chief industries are spinning, bleaching, and the manufacture of linens and sailcloth. Pop., parliamentary and municipal burgh, 1901, 8941, 1911, 8439. Brechin was once a walled town. David I founded a cathedral and bishopric here in 1150. The town was burned by Montrose in 1645. Consult *Registrum Episcopatus Brechensis* (2 vols., Aberdeen, 1850).

BRECK, JAMES LLOYD (1818-76) An American clergyman and educator. He was born in Philadelphia, graduated at the University of Pennsylvania in 1838, at the General Theological Seminary in 1841, and in the latter year joined a mission for work among the Indians in Wisconsin. Later he established the Protestant Episcopal church schools at Faribault, Minn., and was engaged in organizing similar schools at Benicia, Cal., when he died.

BRECK, SAMUEL (1834-) An American soldier, born at Middleborough, Mass. He graduated in 1855 at the United States Military Academy, served as lieutenant of artillery in the Seminole War, and from 1860 to 1861 was assistant professor of geography, history, and ethics at the Military Academy. During the Civil War he was assistant adjutant general successively of General McDowell's division, the First Army Corps, and the Department of the Rappahannock, and assistant in the adjutant general's office at Washington. Brevetted brigadier general, U S A., he continued in the adjutant general's department until retired in 1898, and attained the rank of brigadier general and adjutant general.

BRECKENRIDGE A city and the county seat of Wilkin Co., Minn., 215 miles west by north of St. Paul, on the Red River of the North, the Otter Tail, and the Bois de Sioux rivers, and on the Northern Pacific and the Great Northern railroads (Map Minnesota, A 4). It is a railway division point and has grain elevators, flour mills, etc. Breckenridge contains a hospital and owns its water works and electric light plant. It has adopted the commission form of government. Pop., 1890, 655, 1900, 1282, 1910, 1840.

BRECKENRIDGE, HUGH HENRY (1870-). An American painter, born at Leesbury, Pa. He was a pupil at the Pennsylvania Academy of Fine Arts and won the scholarship for study abroad (1892). He then studied with Bouguereau, Ferner, and Doucet in Paris. On

his return he became instructor and secretary of the Faculty of the Pennsylvania Academy in 1894. His paintings, both oil and water color, are praised for the facility of their execution. He received the Corcoran prize at Washington in 1903 and the gold medal of the Philadelphia Art Club (1907), and was on the International Jury of Awards at the St. Louis Exposition in 1904. He is represented in the collections of the Pennsylvania Water Color Club, and the Art Club of Philadelphia, the St. Louis Club, and the University Club of Indianapolis.

BRECKENRIDGE, LESTER PAIGE (1858-) An American mechanical engineer, born at Meriden, Conn. He was educated at the Sheffield Scientific School of Yale University, became instructor at Lehigh University in 1882, was professor of mechanical engineering at the Michigan Agricultural College in 1891-93, and a professor at the University of Illinois in 1893-99. The last-named institution's Engineering Experiment Station he directed from 1905 until 1909, when he became professor of mechanical engineering at the Sheffield Scientific School. In 1897-99 he designed the dynamometer car, and in 1901 he invented an automatic recording machine. His publications include *An Extension of the Dewey Decimal System of Classification Applied to the Engineering Industries* (1899, 6th ed., 1912), *High Speed Tool Steels* (1905), *Fuel Tests with Illinois Coal* (1908), *Steaming Tests of Coals and Related Industries* (1912).

BRECKINRIDGE, JOHN (1797-1841) An American clergyman, born in Cabell's Dale, Ky. He graduated at Princeton College (1818) and studied at the Theological Seminary, and in 1822 was licensed by the Presbyterian church to preach. He was chaplain of the Federal House of Representatives from 1819 to 1821. His first church was in Lexington, Ky. (1823-26), where he established a newspaper, the *Western Luminary*. He also had a charge in Baltimore from 1820 to 1831, when he removed to Philadelphia and for several years was secretary and general agent of the Presbyterian Board of Education. In 1836 he became professor of theology in Princeton Theological Seminary, and two years later he was made secretary and general agent of the Board of Foreign Missions. He resigned in 1840 and just before his death was chosen president of Oglethorpe University, in Georgia. He published, under the title *Roman Catholic Controversy* (1836), his famous debate with the Rev. John Hughes, afterward Archbishop of New York.

BRECKINRIDGE, JOHN CABELL (1821-75) An American lawyer, soldier, and politician, born near Lexington, Ky. He was educated at Centre College and at Transylvania University and practiced law at Lexington. He served as major in the Mexican War, sat in the State Legislature, and was a member of Congress from 1851 to 1855. In 1856 he was elected Vice President of the United States on the ticket with James Buchanan. In 1860 he was nominated for President by the extreme Southern section of the Democratic party, but, with Douglas and Bell, was defeated by Lincoln, receiving 72 electoral votes. He was immediately chosen United States Senator, but resigned to join the Secessionists, and entered the Confederate army. He was made a major general in 1862, served throughout the war, and took a prominent part in the battles of Shiloh, Murfreesboro, Chicka-

mauga, Chattanooga, and Cold Harbor. He was Early's second in command in the Shenandoah campaign in 1864. From January to April, 1865, he was Secretary of War in the cabinet of Jefferson Davis. At the close of the conflict he escaped to Europe, where he remained until 1868, after which he devoted himself to the practice of law.

BRECKINRIDGE, JOSEPH CABELL (1842-). An American soldier, born in Baltimore, Md., a son of Robert J. Breckinridge. He studied at Centre College, Ky., and the University of Virginia, entered General Nelson's army of Kentuckians, and subsequently was assigned to the Second Artillery, U. S. A. He served in the Shiloh, Gulf, and Atlanta campaigns, and was brevetted major for meritorious conduct before Atlanta. He was a member of the staffs of Generals Thomas, McDowell, and Halleck. He became brigadier general and inspector general in 1889. During the Spanish-American War he served as major general of volunteers in the Santiago campaign. He was inspector general of the United States army from 1899 until he retired in 1903.

BRECKINRIDGE, ROBERT JEFFERSON (1800-71). An American clergyman, brother of Rev. John Breckinridge (q.v.). He was born in Kentucky, graduated at Union College in 1819, practiced law in his native State, and was a member of the Legislature. In 1829 he joined the Presbyterian church, and in 1832 obtained a charge in Baltimore, where he remained for 13 years. In 1845 he became president of Jefferson College, and two years later removed to Kentucky and became State Superintendent of Public Instruction. In 1853 he became professor of theology in Danville Seminary. He was a strong old-school leader in the great division of the Presbyterian church. In the slavery discussion he was extreme on neither side, and when the Civil War began he was for the Union, though he was much opposed to the Emancipation Proclamation (q.v.). In 1864 he was president of the Republican convention which nominated Lincoln for a second term. Dr. Breckinridge is credited with having been the principal author of the common-school system of Kentucky. His principal work is *The Knowledge of God, Objectively and Subjectively Considered* (2 vols., 1857-59).

BREC'ON, or BRECK'NOCK (from *Brychan*, a native prince of the fifth century), or **ABERONDDIRU**. The capital of Brecknockshire, South Wales, situated in an open valley in the middle of the county, at the confluence of the Usk and Honddlu, 171 miles west-northwest of London (Map: Wales, C 5). It lies in the midst of fine mountain scenery and has beautiful public walks. The Priory of St. John is an excellent example of early English architecture and is considered the finest parish church in Wales. Ely Tower, the only remaining fragment of the old castle, is famous as the scene of the conference between the Bishop of Ely and the Duke of Buckingham, which resulted in the overthrow of Richard III. The town owns its water supply, markets, and slaughterhouses. It has manufactures of flannel and coarse cloth, but its principal trade is in lime. Pop., 1891, 5794; 1901, 5875; 1911, 5908. South of Brecon lie the twin mountain peaks, the Brecon Beacons. The town was founded soon after the Conquest. It was the birthplace of the famous actress Mrs. Siddons.

BREC'ONSHIRE, or BRECK'NOCKSHIRE.

An inland county of South Wales, to the south of Radnor, from which it is separated by the Wye. Its length is about 35 miles, its average breadth 20 miles, and its area 734 square miles, of which two-thirds are cultivated (Map: Wales, C 5). Coal, iron, and lead are mined, and there are important iron manufactures, but agriculture provides the chief industries. The chief towns are Brecon, the county town and the only corporate one, Builth, Cricheffell, Hay, and Llanelli. Pop. (half of whom speak Welsh), 1891, 57,000, 1901, 59,900. 1911, 65,999.

BREDA, brá-dá' (Dutch *brede*, a plain, from *breed*, A.S. *brād*, Ger. *breit*, Eng. *broad*). A town in the province of North Brabant, Holland, situated at the confluence of the Merck and the Aa (Map: Netherlands, C 3). It has an old castle, dating from 1350, which was for a time the residence of Charles II of England, but is now used as a military academy. Among the numerous churches, the most prominent is the Gothic cathedral dating from the fifteenth century, and containing the magnificent tombs of Count Engelbert II of Nassau and his wife. The fortifications of the town, now dismantled, were once very formidable and were provided with facilities for inundating the surrounding country in case of war. Breda manufactures carpets, cloth, and cigars, and its commerce is facilitated by a good harbor. The town has had a very stormy career and has been the scene of a number of historical events. It was besieged and taken repeatedly by the Spanish and the French, and it was at Breda that the protest of the Dutch nobles against Spain, known as the "Compromise of Breda," was presented in 1566. It was also from Breda that Charles II issued his "declaration" before his restoration in 1600. Pop., 1905, 27,503; 1911, 27,259.

BREDA, DECLARATION OF. See CHARLES II. **BREDAHL**, brá-dál', CHRISTIAN HVIID (1784-1860). A Danish poet. He was born at Hellestrup and was a fellow pupil of Ingemann at the gymnasium of Slagelse. His first poetic work, *Dramatiske Scener*, was published in 5 vols. from 1819 to 1835. In these dramas, as in his later works, he reveals an intense love of natural conditions and a thorough dislike of excess of culture. Bredahl is closely identified with the philosophical spirit of the eighteenth century as exemplified by Rousseau; and in his masterpiece he inveighs against tyranny and avarice, the arrogance of the nobility, and the domination of the priesthood. He died in penury. A new edition of his *Dramatiske Scener* was published in 1885 in 3 vols. at Copenhagen.

BREDEN, brá'den, CHRISTIANE (1844-1901). An Austrian actress and poet known under the pseudonym of Ada Christen, born as Christiana Friderik in Vienna. She was married in 1864 to Siegmund von Neupauer and in 1873 to Adalmar Breden, but retained her pseudonym. She was at first an imitator of Heine, but developed considerable originality in her later works. Her works include *Lieder einer Verlorenen*, poems (1868; 3d ed. 1873); *Schatten*, poems (1873); *Faustina*, a drama (1871); *Emma*, a novel (1873); *Unsere Nachbarn* (1884); *Jungfer Mutter, eine Wiener Vorstadtschichte* (1892).

BREDERO, brá-dá'ró, GERBRAND ADRIAENSZON (1585-1618). A Dutch playwright and poet, born in Amsterdam. He was educated as a painter, but turned to literature, in which he

became celebrated for his lyrics (4th ed, Amsterdam, 1622), and took rank among the foremost Dutch writers of comedy. His most important plays are *Het Moortje* (1615), *De Stomme Riddet* (1618), and *Spaansche Babanders Verolimo* (1618). The last named is considered his best work. His *Works* were first published in Amsterdam in 1638, the last edition was that of 1885-88 (1b, 3 vols.) Consult the study by Ten Brink, *Gerhard Adriaenszoon Brederode* (Utrecht, 1859).

BREDERODE, brâ'de-rô'de, HENDRIK, COUNT VAN (1531-68). One of the sovereign counts of Holland, and a leader against Spanish domination in that country. He was one of the leaders of the League of the Gueux ("The Beggars"), and is said to have drawn up the "Compromise" of 1566. After the complete success of the Spaniards he asked Egmont to intercede for him with the regent. His followers, however, were dispersed, some were put to death, and he himself died a few months later in Germany, whither he had fled.

BREDOW, brâ'dô, ADALBERT VON (1814-90). A German soldier, born in Berlin. As commander of the Second Cavalry Brigade of Prussia, during the War of 1866, he rendered distinguished services at the battles of Trautenau and Sudowa. Upon the outbreak of the Franco-Prussian War he was assigned to the command of the Fifth Cavalry Division, in which capacity he performed, with barely six squadrons, the most brilliant cavalry charge of the war—the desperate assault at Mars-la-Tour, by means of which a large division of the French army was rendered powerless to assume the offensive. The gallant feat of this officer, who became lieutenant general in 1871, has been perpetuated in song and story.

BREDOW, GOTTFRIED GABRIEL (1773-1814). A German historical writer, born in Berlin. He studied at Halle, in particular classical subjects under F. A. Wolf, succeeded J. H. Voss as rector of the school at Eutin (Lubeck) in 1802, and in 1804 became professor of history in the University of Helmstedt. In 1809 he was appointed professor in the University of Frankfurt-on-the-Oder, with which he continued to be connected after its removal to Breslau, in 1811. His publications include a *Handbuch der alten Geschichte*, (*Geographie und Chronologie*) (1799, 6th ed 1837), *Untersuchungen über einzelne Gegenstände der alten Geschichte*, (*Geographie und Chronologie*) (1800-02), *Chronik des neunzehnten Jahrhunderts* (2 vols, 1804-05, continued by Venturini), highly esteemed by Germans of the time because of its bold expressions regarding French domination. His *Weltgeschichte in Tabellen* (1801, 9th ed 1851) was translated (with additions) into English by J. Bell (London, one vol folio, 1820, from the 4th German ed.), and his *Merkwürdige Begebenheiten aus der Allgemeinen Weltgeschichte* reached its thirty-seventh edition in 1880.

BREE, brâ, MATTHEU IGNACE VAN (1773-1839). A Flemish historical and portrait painter. He was born in Antwerp and studied at the Academy in that city and under P. J. van Regemorter, also in Paris under Vincent. He was appointed professor at the Academy of Antwerp in 1804 and director in 1827. His art was in the customary classic manner of his day, modified by the influence of Rubens. He played a more important part as a teacher than as a painter, and among the men whom he

helped to train were Wappers, De Keyser, De Baekelaer, Van Ysendyck, and Wiertz.

BREECH (*breach*, the hinder part of the body, AS *briça*, breeches, pl of *briça*, Dutch *broek*, a pair of breeches, cf Lat *braccæ*, trousers, breeches.) The rear part of a gun or other object. The heavy piece of metal which closes the breech of a gun and receives the pressure of the powder gas is known as the *breechblock* or *breech plug*. When a gun is charged through the breech, it is known as a breechloader. The breech and its adjuncts are important parts of guns and small arms and will be found described and illustrated in the articles GUNS, NAVAL, ORDNANCE, SMALL ARMS.

BREECHES BIBLE See BIBLE, CURIOUS EDITIONS OF.

BREECHES BUOY See LIFE-SAVING SERVICE.

BREECH-LOADING ARMS See SMALL ARMS, ARTILLERY, COAST ARTILLERY, FIELD ARTILLERY, GUNS, NAVAL, ORDNANCE.

BREED, DAVID RIDDLE (1848-) An American Presbyterian clergyman and educator, born in Pittsburgh, Pa. He graduated at Hamilton College in 1867 and at Auburn Seminary (Presbyterian) in 1870. He held pastorates in St Paul and Chicago until 1894, when he was called to the First Presbyterian Church of Pittsburgh. In 1898 he became professor of practical theology in Western Theological Seminary, Allegheny, Pa., and he identified himself prominently with his denomination's Board of Missions for Freedmen. Among his publications are many tracts, notably *More Light*, which had a wide circulation, works on hymnody, especially a frequently reprinted *History and Use of Hymns and Hymn Tunes*, *Abraham, the Typical Life of Faith* (1886), *History of the Preparation of the World for Christ* (1891), *Preparing to Preach* (1911).

BREED, ROBERT STANLEY (1877-) An American biologist, born at Brooklyn, Pa. He was educated at Amherst College, at the University of Colorado, and at Harvard. In 1902 he became professor of biology at Allegheny College and was there secretary of the faculty in 1907-10. He became known especially for his researches on the post-embryonic development of insects and for his contributions to scientific journals on the public milk supply. In 1903 he published *The Changes which Occur in the Muscles of a Beetle during Metamorphosis*.

BREED, brî'dê (Dutch, "the Broad"). A river of Cape Colony. It rises about 75 miles northeast of Cape Town, flows south, and empties into St Sebastian Bay (Map Cape Colony, E 9). It is navigable, by small vessels, for 40 miles.

BREEDING (AS *briëden*, to nourish, keep warm, from *brâd*, blood). A breed, in domestic animals, is a race, variety, or strain resembling the general type of the species, distinguished by particular characters or qualities which are transmitted and maintained. Breeds owe their origin to the tendency of animals toward variation and to natural and artificial selection. Under domestication the same kind of species of animals has changed naturally to a different extent and in a different direction as a result of environment. Certain variations have been found better adapted to specific purposes, and these variations have been perpetuated by man by restricting the coupling, i.e., by selection and breeding. This process, carried on consis-

tently through successive generations, has produced a group of animals of sufficiently marked characteristics, which are capable of being transmitted to the offspring, and which entitle these animals to be recognized as distinct breeds.

Plants, like animals, tend toward variation, and, as a result of this, the equivalent of different breeds, usually spoken of as varieties or strains, have been produced. The principles underlying the breeding of plants and of animals are essentially the same, but the methods of operation are not entirely analogous; hence the subjects of plant breeding and animal breeding can best be considered separately.

Plant Breeding. The variation in plants may be due to natural causes, as environment, etc., or it may be the result of design on the part of man, in which case it is secured by artificially crossing two or more races or varieties. Artificial variation is secured by fertilizing the ovules of one plant with pollen from another. Plant breeding is the fixing, by selection, of the desirable traits found in the variations, whether naturally or artificially produced. The farmer or gardener who seeks to improve his crop by planting seed from the most favored individuals is practicing plant breeding. This kind of plant breeding has been going on in all countries ever since the cultivation of plants was begun. The improvement of plants by selection from artificially produced variations is of more recent origin. The production of varieties by crossing has its basis in the sexuality of plants, a discovery of Camerarius in the last decade of the seventeenth century. Crossing is the fertilizing of a flower of one variety with the pollen of a flower of another variety of the same species. Hybridizing is the same operation, but between two species of the same genus. The scientific breeding of plants through the production of hybrids has as its basis Mendel's law (g.v.), first published in 1865 but passed unnoticed until about 1901. By this law, within certain limits the inheritance of parental characters and the subsequent behavior of the hybrid plants can be definitely foretold. Only a portion of the offspring will show true hybrid characters, and these are the ones to be selected for further breeding experiments. In the elucidation of these principles important work has been done by Bateson and Biffen in England, Johannsen in Denmark, Von Rümker and Frowirth in Germany, Von Tschermak in Austria, Nilsson-Ehle in Sweden, and Webber, Spillman, East, Emerson and others in the United States. De Vries, who is responsible for the "mutation theory," provides an additional method of securing material for plant breeding. He claims that new forms, which he calls mutations, may suddenly arise from species that have long been without evident variation and that by the recognition and utilization of these improved races of plants may be secured. The first artificial hybrid is said to have been produced by an English gardener, Thomas Fairchild, in 1719, when he crossed the carnation with the sweet William. The practical application of hybridization to plant breeding did not take place until the early part of the nineteenth century, when the investigations of Knight, an Englishman, and Van Mons, a Belgian, were made. In the United States the earliest investigators along this line were Joseph Cooper and James Thatcher. Since these pioneers, many persons have devoted their energies to the improve-

ment of races of cultivated plants. Conspicuous among these have been Hallet, of England; Rimpau, of Germany; Vilmorin, of France; and Hays, of the United States, all of whom have developed new and improved varieties of cereals; Lous de Vilmorin and his son, Henri de Vilmorin, of France; Rabbethge and Giesecke, of Germany, who have developed the sugar beet; Richter, Girard, and Burbank, who have worked with potatoes; Livingston with tomatoes; Clark and Hinson with Sea Island cotton; Webber with Upland cotton; Hovey and Dana with pears; Bull, who originated the Concord grape in 1849; Allen, Munson, Millardet, with grapes; Burbank with plums and berries. Many others have worked with all sorts of fruits and ornamentals.

In any system of plant breeding selection plays a most important part. Some natural variants or sports are propagated by cuttings or grafts, which is the most simple method of plant breeding. Others are grown from seed, and plants from these tend to variation. This tendency can be overcome only by continual rejection of all plants that depart from the desired type, seed being saved only from those which most nearly conform to the ideal type. By continuing this process through a number of years or crops, a race will be found that will closely resemble the type in all its individuals. The amount of care and labor involved may be seen from the statement that a breeder of sugar beets examined, in one season, more than 3,000,000 roots of an improved variety, only about 3000 of which were accepted for further trial.

When selection is practiced for producing new races or varieties of cultivated plants, there are a few axiomatic principles to be observed: Always continue selection upon the same lines, once it is begun. Great size and numerous parts cannot usually be secured in the same variety, nor are extraordinary earliness and great productivity found associated together. See HEREDITY; VARIATION; MUTATION; PLANT BREEDING.

Animal Breeding. The art of breeding animals until recently was founded on the practice of the most successful breeders, and its rules were almost exclusively empirical in their origin. They were not worked out on the basis of scientific investigation and experiment, but may be regarded rather as contributions to science than deductions from it.

Breeding has been practiced from the earliest times, the horse having apparently received more attention from the ancients than the other kinds of farm animals. The ancients evidently had some knowledge of the laws of heredity, although much stress appears to have been laid upon the exercise of external influences as well. The early breeders had no consistent system of selection—their standards of excellence were, in fact, constantly changing, so that the conception of the "best" differed widely from time to time, and this prevented any very high development of the most valuable qualities except in the development of the Arabian horse and the English race horse known as the Thoroughbred. Soon after the middle of the eighteenth century Robert Bakewell, of England, practiced a new system of breeding, based upon careful selection from a single variety or breed, and close breeding to develop certain desirable qualities. The crossing of different breeds had previously been held to be the road to improvement. He regarded the animals he worked with as plastic, and he sought so to mold these plastic forms

as "to give expression to his ideal conception of the qualities that constitute perfection." His work, and the following out of his theories by a long line of able breeders have given us many improved breeds of live stock, each adapted to special conditions and purposes.

Since Bakewell's time breeders have recorded many interesting experiences and observations, but so few underlying principles could be deduced from them that the breeding of animals was not placed on a scientific basis until the beginning of the present century. When good judges of live stock attempted to transfer the desirable characteristics of their animals to the next generation it was a game of chance, and though in many cases the breeder obtained satisfactory results there was much unavoidable loss of time and money. Modern scientific investigation has changed the situation. Microscopic studies of the germ cell and of embryonic tissues have revealed conditions which influence the developing organism, and the discovery of the Mendelian principles has yielded such positive results that now it is possible in many cases to predict, with a reasonable degree of certainty, what characters may be inherited. Experimental evidence has shown that many characteristics of an individual may be inherited independently, that some of these unit characters are dominant over others, that all ancestors of the same degree do not contribute equally to the hereditary qualities of the offspring, and that Weismann's theory of heredity and Galton's ancestral law, in their original forms, were founded on incorrect assumptions.

These discoveries are of commercial importance, as they show how feed and other environmental conditions are limited by heredity. The breeder to-day need not work in the hap-hazard manner which was necessary in the closing years of the nineteenth century.

Mendel and his followers have shown that many characteristics run in pairs—one a masked or dominant character, the other a masked or recessive character. By proper mating the recessive character can be separated from the dominant one and new combinations can be made. By successive matings recessive characters can be bred pure, though it is difficult to eliminate the recessive character from the dominant so that the dominant character may be bred true. Thus, when black cattle are crossed with red cattle the offspring are usually black, not roan or some mixture of red and black. The Mendelian explanation is that these black calves are in reality crosses containing red, though the red is suppressed.

Experiments also indicate that white cattle are dominant to black, so that from these crosses it is easier to develop a strain of pure black cattle than it is to establish a white strain. In horses the relative dominance of color is probably in the following order: white, roan, gray, bay or brown, black, and chestnut or yellow.

An important application of these principles is the inheritance of sex, which is now thought to be similar to the inheritance of other characters. If further experiments substantiate this possibility, the breeder will be able to control to some extent the sex of his animals. Another application is the so-called sex-limited inheritance, which can be defined as inheritance where the same characteristic behaves differently in the two sexes. A familiar instance of this is the barring of feathers in Plymouth Rock fowls.

The male but not the female will transmit the barred condition to all its progeny when mated to brown Leghorns. The females will transmit it only to the male progeny. According to experiments reported by Dr. Raymond Pearl, of the Maine Experiment Station, high egg-laying capacity is transmitted through the male. If this should prove to be true of all breeds of fowls, more attention must be given to the male than to the female breeding stock if high egg production is the object of the breeder. High milk production is also believed to be inherited through the male line, but positive proof is yet lacking.

The selection of the male is further important because he impresses his characters upon a larger number of offspring than does the female.

In developing new strains and new breeds, the breeder does not make new characters, he merely perpetuates the desirable and eliminates the undesirable characters which are presented to him by making new combinations. New characters may arise "spontaneously" or by "mutation" from unknown causes. These the breeder can take advantage of if it is desirable to have them perpetuated, because the characters which originate in this way usually prove to be dominant. The variation of animals is greater under domestication than in nature, consequently the breeder frequently finds many new variations to choose from in the development of new strains or types.

There are two difficulties, however, which are encountered when the Mendelian principles are applied to practical breeding operations. In the first place, not all characters are unit characters inherited in pairs, and, secondly, when they are inherited in pairs the dominance of one of the paired characters is not always perfect. At present there is no satisfactory explanation of the imperfections of dominance.

Mendelian principles are theoretically alike valuable to the plant and animal breeder, but in their application they have been of more service to the plant breeder than to breeders of animals. But they have shown why inbreeding brings uniformity of type and why and when pedigree counts and when it does not. They also throw considerable light on the generalization that "like tends to beget like" and under what conditions some characters may remain latent.

Selection and the coupling of animals is the practical application of the principles of breeding as briefly enumerated, and its successful accomplishment requires the ability to conceive or comprehend an ideal and to maintain or develop it. In the coupling of animals several systems or practices are recognized, depending upon the relationship of the sire and the dam, as in and-in breeding, line breeding, crossbreeding, etc. In-and-in breeding, or close breeding, is the coupling of animals nearly related. Regarding the closeness of relationship implied in these terms, it not only appears that no definite rule has been established, but also that different writers use them with a somewhat different shade of meaning. The object sought is to establish desired forms or qualities with the greatest certainty and in the least time. The fewer the ancestors the easier it is to breed animals with the desirable characteristics. Those who object to close breeding hold that it carries with it danger of loss of constitutional vigor and fertility in the offspring, loss of size, and sometimes malformation. This danger un-

doubtedly depends upon the extent to which the practice is carried and upon the character of the animal. The more purely bred and uniform in type the stock, the greater does the probable danger become; while with miscellaneous bred stock the evil effects are comparatively slow in showing themselves. All the great breeders have practiced close breeding to a greater or less extent, apparently for the purpose of retaining and fixing certain desirable characteristics that have been developed by modified conditions. They evidently intended to breed together animals of the same qualities, regardless of relationship. The practice is generally conceded to be an important means of improvement, when judiciously followed.

Closely allied to in-and-in breeding is line breeding, which, as applied to a distinct system, is comparatively new. It consists in breeding within a few closely related stocks or families, no animals being interbred which are not closely connected in the general lines of their blood. Owners of pure-bred stock are usually line breeders. The danger of a loss in size, vigor, and fertility is less than with inbreeding. Cross-breeding is the coupling of animals of distinct breeds or a cross between a distinct breed and an animal of unknown breeding or "native."

The supposed influence of a previous sire, or "telegony," believed in by many breeders, has been treated experimentally many times, but thus far the evidence is negative. The classic instance of Lord Morton's mare, usually cited by believers in telegony, has now been discredited by the Penycuik Experiments of Professor Ewart. Maternal impression, another persistent belief of many breeders, also lacks scientific proof. Practical breeders believe that "acquired characters" are inherited, but this is stoutly denied by Weismann and his followers.

No great progress can be made in breeding animals so long as the breeding stock consists of unsound individuals or is of unknown breeding. Several States, beginning with Wisconsin in 1906, have passed legislation relative to the registering and control of stallions in order to prevent fraud and to eliminate unsound sires. Another movement to improve stock by grading up with pure-bred sires is by cooperative or circuit breeding. This is done where a community of farmers interested in the improvement of any one breed form an association binding themselves to advance the interests of that breed and to use only pure-bred males. This plan has been the most successful in improving dairy cattle in connection with cow-testing associations, which purchase the best bulls obtainable.

Of late an increasing amount of attention has been given to systematic investigations upon the principles of breeding, the laws of heredity, transmission of qualities, etc. The United States Department of Agriculture has undertaken studies in animal breeding in cooperation with a number of the agricultural experiment stations, using horses, sheep, cattle, and poultry. In 1903 the American Breeders' Association was formed for the object of advancing knowledge of this subject. For a more detailed discussion of the theories, principles, and practice of breeding animals, the reader is referred to the articles on BIOLOGY; HEREDITY; MENDEL'S LAW; WEISMANNISM. Consult: Darwin, *Variations of Plants and Animals under Domestication* (London, 1885); Castle, *Heredity in Relation to Evolution and Animal Breeding* (New York, 1911);

Davenport, *Principles of Breeding* (Boston, 1907); Ewart, *The Penycuik Experiments* (London, 1899); Ewart, "The Principles of Breeding and the Origin of Domesticated Breeds of Animals," *Annual Report of Bureau of Animal Industry, U. S. Dept. of Agr., 1910*; Kronacher, *Gesundzucht der Zuchtungsbiologie* (Berlin, 1912); Marshall, *Breeding Farm Animals* (Chicago, 1911); Pearl, *Inheritance in Poultry* (several bulletins from the Maine Experiment Station); Wilson, *Principles of Stock-Breeding* (London, 1912). The different breeds of live stock are considered under CATTLE; HORSE; SWINE; POULTRY, ETC.

BREED'S HILL. The hill in Charlestown (Boston), Mass., on which the battle of Bunker Hill was fought, and which is the site of Bunker Hill Monument. It is somewhat south of the true Bunker Hill.

BREESE, KIDDER RANDOLPH (1831-81). An American naval officer, born in Philadelphia. In 1846 he entered the navy as a midshipman. At the beginning of the Civil War he served as commander of the third division of Porter's mortar flotilla, in the attacks on New Orleans and Vicksburg (1862), and, as lieutenant commander, participated in the important operations on the Mississippi and its tributaries, during 1863 and 1864. He was then appointed fleet captain of the North Atlantic blockading squadron, in which capacity he commanded the storming party in the naval assault on Fort Fisher (g.v.), Jan. 15, 1865. In 1874 he was raised to the rank of captain.

BREEZE. See BEAUFORT SCALE.

BREFELD, brä'fēlt, OSKAR (1839-). A German botanist, born at Telgte, Westphalia. He was appointed professor of botany at Eberswalde (1878), Münster (1884), and Breslau (1898). He retired in 1907. His scientific investigations may be said to cover the field of mycology. It was he who introduced the so-called "gelatin cultures" which at one time gained such wide application in bacteriology. He published a series of volumes entitled *Untersuchungen aus dem Gesamtgebiete der Mykologie* (1872).

BREGENZ, brä'gēnts (anciently, Lat. *Brigantium*, the town on the heights, from Celt. *brigh*, *brig*, heap, elevation). The capital of the Austrian crownland of Vorarlberg, situated about 1295 feet above sea level, on the eastern shore of Lake Constance (Bodensee), 6 miles southeast of Lindau by rail, and 80 miles west-northwest of Innsbruck. It consists of the old, or upper town, and the new town, almost surrounding the former. Bregenz has a town hall and a museum containing a collection of Roman antiquities found in the neighborhood. Its position on the lake has made it an important port and commercial centre. Its chief trade is in grain, cattle, and products of the cotton and silk factories of Vorarlberg. Pop. of the district in 1910, 34,743. Under the name of Brigantium the town was a Roman station, and in the Middle Ages the seat of the powerful counts of Bregenz. In the sixteenth century it passed to the house of Hapsburg. Consult *Helbrook, Die Bevölkerung der Stadt Bregenz* (Innsbruck, 1912).

BRÉGUET, brä'gä', ABRAHAM LOUIS (1747-1823). A French mechanician and watchmaker, a native of Neuchâtel. The astronomical and nautical instruments invented by him were noted for the perfection of their workmanship. His improvements in watches included the use of rubies

in pivot holes. He fled to London during the Reign of Terror, but returned after the ninth Thermidor. A grandson, LOUIS FRANÇOIS CLEMENT (1804-83), also a watchmaker, had charge of establishing the first telegraphic line in France. He also invented the system of electric clocks, for transmitting time to a distance and published a number of works on the telegraph. He wrote *Télégraphie électrique*.

BREHM, brām, ALFRED EDUARD (1829-84). A German naturalist and traveler. He was born in Reuthendorf, Feb. 2, 1829, and died there Nov. 11, 1884. He studied natural history and ornithology with his father, who was a celebrated ornithologist. From 1847 to 1854 he traveled through Egypt, Nubia, and the Sudan, and later in Spain, Lapland, Abyssinia, and Siberia. In 1862 he was appointed director of the Zoological Gardens in Hamburg, and from 1867 to 1874 he was director of the Berlin Aquarium. He published in 1863 the first edition of the *Illustriertes Thierleben*, the most important work of its kind at that time.

BREHM, CHRISTIAN LUDWIG (1787-1864). A German ornithologist. He was born in Schonau, near Gotha, studied theology in Jena from 1807 to 1809, and held several pastorates. He made a collection of 9000 European birds, afterward bought by Rothschild in 1897 for his museum at Tbing. His most valuable works are *Beiträge zur Vogelkunde* (3 vols., 1821-22), *Lehrbuch der Naturgeschichte aller europäischen Vogel* (2 vols., 1823-24), *Ornis* (3 parts, 1824-27), *Handbuch für Liebhaber der Stuben-, Haus- und aller der Zuhaltung wertigen Vogel* (1832), *Der vollständige Vogelfang* (1855), *Die Eier der europäischen Vogel nach der Natur gemalt* (in collaboration with Baedeker and Passler, 1855-67).

BRE'HON (Ir. *breathamh*, *breithamh*, from OIr. *bithon*, judge, from *bith*, *bith*, decision, judgment). **LAW**. The ancient laws of Ireland. In the form in which they have come down to us they consist of a collection of law tracts which were compiled by different hands and at different times and committed to writing probably in the tenth century of our era. M. d'Arbois de Jubainville has shown that the *Senchus Mór* is really made up of treatises belonging to different periods, of which that upon Immediate Seizure is the oldest. While some of the other treatises must be of much later date, this tract cannot in its present form be later than the close of the sixth century, because it contains no trace of the right of succession accorded to women by an Irish council of c. 600, while at the same time it cannot be anterior to the introduction of Christianity, because it contains mention of altar furniture amongst things seizable. These laws derive their name from the *Brehon*, a class of hereditary lawyers and judges, by whom they were preserved by oral tradition and ultimately embodied in written form. These tracts—the most important of which are the *Senchus Mór*, or 'Great Book of the Ancient Law,' and the *Book of Acall*—consist of brief and sometimes rude statements of the law, often expressed in verse, accompanied by elaborate annotations and commentaries made by successive *Brehon* through whose hands they passed. In this way the primitive body of law was modified from generation to generation to conform to the growth of the Irish people in Christianity and civilization. In its original form this law does not differ widely from that of other early systems, such as the

Twelve Tables of Rome, the Mosaic Law, and the barbaric codes of the Middle Ages, most of its provisions having to do with crimes of violence, and the commutation of the penalty for such crimes by money or other payments. The poet Spenser, in his *View of the State of Ireland*, written in 1596, describes the Brehon Law as "a rule of right unwritten, but delivered by tradition from one to another, in which oftentimes there appeareth great share of equity, in determining the right between party and party, but in many things repugning quite both to God's law and man's." This criticism might have been modified if Spenser had been aware of the fact that pecuniary compensation for manslaughter was a salutary device of primitive society for mitigating the horrors and inconveniences of private vengeance, and that it had prevailed in England as well as in all other European countries (See BLOOD FEUD, BLOOD MONEY). As has been seen, he was mistaken, also, in believing that the Brehon Laws were, at the period of his visit, an unwritten code, though they may still, in that backward state of society, have depended largely on tradition for their preservation. Many manuscript collections of these laws, dating from the fourteenth to the sixteenth century, still exist in public and private libraries in England, Ireland, and Belgium. The first translation into English was made by O'Donovan and O'Curry in four large volumes and published in 1865-69. Notwithstanding their deficiencies, the Brehon Laws are the most remarkable code possessed by any ancient people, and reveal a high degree of civilization (See BRETTIS AND SCOTT). Sir Henry Sumner Maine has considered the primitive Irish law at length and with great learning in his *Lectures on the Early History of Institutions* (London, 1876). Consult also Ginnell, *The Brehon Law* (London, 1894); D'Arbois de Jubainville, *Études sur le droit celtique* in vol. vii of the *Cours de Littérature celtique* (Paris, 1895); Joyce, *Social History of Ancient Ireland*, vol. 1, pp. 168 et seq. (London, 1903); Hyde, *Literary History of Ireland*, pp. 583 et seq. (London, 1906).

BREISACH, brî-zâc' (anciently, Lat. *Mons Brisacius*, possibly from Celt. *brig*, elevation, hill + Teut. *aha*, water), ALZ. A very old town of the Grand Duchy of Baden, situated on a basaltic rock 260 feet above the Rhine, on its right bank, about 12 miles west of Freiburg (Map Germany, B 4). It is a thriving little town, with manufactures of wall paper, beer-brewing, and wine, and a trade in lumber and cattle. As early as the time of Julius Caesar Mons Brisacius was known as a strong military position and was taken by Ariovistus when he invaded Gaul. During the Middle Ages it frequently changed masters and, after having been for a time a free Imperial city, became a possession of the house of Austria. Its military importance made it a battle ground for the French and Austrians in the seventeenth and eighteenth centuries. The French destroyed its fortifications in 1744 and, during the War of the Revolution in 1793, burned the town. In 1805 the French handed it over to the house of Baden. Pop., 1890, about 8000, 1900, 3500, 1910, 4707. Consult Coste, *Notice historique sur la ville de Vieux-Breisach* (Mulhouse, 1860).

BREISGAU, brîs'gau (Ger. *Breis*, for *Breisach* + *Gau*, district). A former district in the southwest corner of Germany which extended

along the right bank of the Rhine from Basel to Kiel. In the fourteenth century it belonged to the Hapsburgs; in 1457, to Baden; there were frequent changes of masters, but eventually Austria became mistress of most of it. She was dispossessed in the Napoleonic wars, and since 1810 the whole of Breisgau has been a part of Baden.

BREITENFELD, brî'ten-fêlt (Ger. *breit*, broad + *Feld*, plain, field, referring to the plain near by). A village in Saxony, about 5 miles north of Leipzig, noted as the scene of two battles between the Swedes and the forces of the German Empire. On Sept. 17 (N.S.), 1631, Gustavus Adolphus and the Elector of Saxony overthrew Tilly at Breitenfeld, shattered his army, and saved the cause of Protestantism, which had been imperiled by the fall of Magdeburg. Eleven years later, Nov. 2, 1642, Torstenson, the pupil of Gustavus, signally defeated the Archduke Leopold and General Piccolomini on the same spot. Breitenfeld also had some of the fighting around Leipzig in October, 1813. Consult Opitz, *Die Schlacht bei Breitenfeld 1631* (Leipzig, 1892).

BREITHAUPT, brî'thaupt, JOHANN AUGUST FRIEDRICH (1791-1873). A German mineralogist. He was born at Probstzella, Thuringia, and studied at the University of Jena and at the Academy of Freiberg. Here he received an appointment in 1813 as teacher and lapidary and in 1827 became professor. He wrote *Ueber die Echtheit der Krystalle* (1816) and *Vollständige Charakteristik des Mineralsystems* (1829; 3d improved ed., 1832). He also continued Hoffmann's *Handbuch der Mineralogie* (3 vols., 1836-47), adding five chapters to this valuable work. Towards the close of his life he became almost totally blind. He increased the nomenclature of crystallography and carefully examined almost all the minerals known in his day and took 3000 measurements of calcite alone. The opening of the great coal fields at Zwickau, in Saxony, was due to his initiative. His other publications include *Die Paragenesis der Mineralien* (1849) and *Die Bergstadt Freiberg* (1825; 2d ed., 1847).

BREITKOPF, brî'tkôpf, JOHANN GOTTLIEB IMMANUEL (1710-94). A German printer and proprietor of a well-known publishing house of Leipzig, established in 1664 and known as Breitkopf & Härtel since 1795. He was born in Leipzig and graduated from the university of that city. His investigations in history and mathematics led him to a scientific study of printing, which resulted in a more artistic development of German text and an improvement of musical notation (1754). At the time of Breitkopf the old form of musical notation had been almost forgotten. Compositions were either written or engraved, and the form of printing music now principally used is undoubtedly due to his initiative. His writings include the following: *Ueber die Geschichte der Erfindung der Buchdruckerkunst* (1779); *Ueber den Druck der geographischen Karten* (3 parts, 1777-79); *Ueber Bibliographie und Bibliophilie* (1793).

BREITMANN, brî'tmân, HANS. See LAND, CHARLES GODFREY.

BREKELINKAM, brâ'ke-lêp'kâm, QUIRYN (1620-68). A Dutch genre painter. He was born at Zwammerdam, near Leyden, and was probably a pupil of Gerard Dou. He depicted with great fidelity to nature scenes from folk

life, market scenes, and domestic interiors. His works are characterized by simplicity and remarkably effective coloring. The best known are: "The Fireside" (1664, Rijksmuseum, Amsterdam); "Monk Writing" (Louvre); "Consultation" (ib.); "Interior" (1662, Museum of Lille); "The Sandwich" (Leyden Museum); "Saying Grace" (Cassel Gallery); "Game of Cards" (Brunswick Museum); "A Brazier" (Augsburg Gallery).

BREMA, MARIE. An English opera singer, born in Liverpool. After studying under Georg Henschel, Madame Bessie Cox, and Alfred Blume, she made her début at Oxford in the rôle of Adrienne Lecouvreur. In 1891 she appeared at the Shaftesbury Theatre in the part of Lola in *Cavalleria Rusticana*. In the following year she sang at Covent Garden in the Royal Italian Opera, taking the rôle of Guinevere in Bemberg's *Elaine*. Later she sang in *The Ring* at the Metropolitan Opera House in New York, at the Bayreuth Festival, the rôles of Delilah and Orphée at Brussels, and that of Brunnhilde in Paris. In 1911 she produced *Orpheus* in the Savoy Theatre, London, and in 1912 she appeared in *The Ring* in the Wagner Festival in Brussels.

BREMEN, Ger. pron. brâ'men (*Brema, Bremen* of the eighth century, possibly the *Pharaurum* of Ptolemy). A city of northwestern Germany, capital of the state of Bremen, in lat. 53° 5' N. and long. 8° 48' E., on both banks of the Weser, 46 miles from the North Sea and 71 miles by rail southwest of Hamburg. The city covers about 10 square miles; at the census of Dec. 1, 1910, its population was 247,437, as compared with 163,297 in 1900, 125,000 in 1890, 113,000 in 1880, and 81,000 in 1870. Bremen is divided into the old and the new town—the former on the right, the latter on the left bank of the river, which is spanned by four bridges. The old town has crooked, narrow streets and a quaint appearance; it forms the business district of the city. The new town has broad, straight, well laid-out streets lined with tall, handsome buildings. The ramparts and bastions round the old town have long been leveled, and the site converted into public promenades and gardens, which are laid out in excellent taste. The more important buildings include: the Gothic town hall (Rathaus), which stands on the market square of the old town and was begun about 1405—its celebrated wine cellar has been immortalized by Wilhelm Hauff; the cathedral of St. Peter (now the Lutheran parish church), built in the twelfth century on the site of Charlemagne's wooden church; the thirteenth-century church of St. Ansgarius, with a spire over 300 feet high; the Gothic exchange (1867); the post office (1878); the law courts (1891-95).

The situation of Bremen makes it a great emporium of northwestern Germany, and the city is known especially for its sea-borne foreign trade. It has excellent rail connections with the great industrial centres of Germany, and engineering work carried on in 1887-99 enables large ocean-going vessels to come directly to the city. Altogether there are four harbors, including the "Safety" or original harbor. Bremen carries on an extensive commerce with European countries, the United States of America, the West Indies, Africa, the East Indies, China, and Australia, and is the largest port in Germany after Hamburg. This commerce has shown a remarkable development since 1847, rising from less than \$46,900,000 in that year, to

nearly \$303,700,000 in 1891, to over \$622,000,000 in 1905, and to about \$995,889,500 in 1911 (The commerce figures in this article relate to the state of Bremen, but they are practically coincident with those of the city.) The chief imports are tobacco, coffee, sugar, cotton, rice, skins, dyewoods, wines, timber, hemp, etc. Articles of food and raw materials constitute nearly 80 per cent of all the imports, whereas manufactured articles make up less than 20 per cent. This partly explains why the United States has a preponderance over other countries in respect of those imports. In 1850 imports from the United States were less than twice those from the United Kingdom, in 1911 they were about ten times as great. In 1911 imports and exports, stated in marks, amounted to 2,124,730,000 and 2,047,814,000 respectively (including trade with the German Empire). The following table shows the trade by most important countries in 1910 and 1911, in thousands of marks

	Imports		Exports	
	1910	1911	1910	1911
German Empire	692,773	731,688	931,692	1,047,753
United States	618,986	751,477	215,787	215,786
Australia	107,825	100,951	35,396	37,949
Russia in Europe	89,064	124,524	126,095	122,331
United Kingdom	65,287	70,206	100,622	150,471
Argentina	52,361	41,838	30,742	39,012
British India	43,668	41,065	9,291	12,017
Brazil	32,100	32,720	12,484	13,071
Austria	30,782	23,085	125,068	141,200
Total, incl other	1,908,428	2,124,730	1,879,437	2,047,814

The exports of Bremen consist of woolen goods, linens, glass, rags, wool, hemp, hides, oil cake, wooden toys, etc. Large quantities of tobacco are reexported. With the exception of Hamburg, no Continental port ships so many emigrants to the United States as Bremen. Bremen has manufactures of woollens and cottons, cigars, paper, and starch, and extensive shipbuilding yards, breweries, distilleries, and sugar refineries. It has steam communication with New York, Hull, Havana, the north coast of South America, etc., by vessels of the North German Lloyd Steamship Company.

In the over-sea trade there entered in 1911 6083 vessels of 4,516,782 tons net, and cleared 6228 of 4,479,335 tons net. The growth of Bremen's own merchant marine may be seen from the following figures:

Year	Vessels	Tonnage	Year	Vessels	Tonnage
1862	240	79,000	1892	405	406,000
1862	277	134,000	1900	571	583,000
1872	252	174,000	1905	632	693,870
1882	344	299,000	1911	713	893,767

The city is governed by the same powers as the state (see the following article). Bremen owns its gas works, water works, and electric plant. The municipal management of these undertakings has proved to be a great benefit to the citizens, besides yielding an increasing annual net income to the city treasury.

The street cars are in the hands of private companies, paying the city one-fourth of all their net income in excess of 5 per cent on the capital stock, in addition to a tax of 1 per cent on the gross income and all ordinary taxes levied upon business establishments.

The street cleaning, the health department, and all that goes to make the city clean and

healthful, are well administered, as may be seen from the following figures of death rates in the city and country districts, per thousand. 1894, city, 16.76, country, 22.33, 1898, city, 16.69, country, 21.70, 1904, state, 13.8.

The public schools are maintained and controlled by the city. In addition to the elementary schools, there are a high school, a commercial school, and a number of trade schools. Among the charitable institutions of the city there are three orphan asylums, two homes for neglected children, several hospitals, etc. It is interesting to note that Bremen spends nearly twice as much money on education as on police.

History. Bremen, mentioned in 782 as a missionary centre, was made the seat of a bishopric by Charlemagne in 788. In 845 the see of Hamburg was united to that of Bremen, and the latter became the capital of the new archiepiscopal diocese. In 965 Bremen was made a market town and was placed under the jurisdiction of the archbishop, but by the thirteenth century it had succeeded in acquiring virtual independence in secular affairs. It extended its trade to England and Scandinavia, founded a number of colonies, and ruled over both banks of the Weser to the sea. It joined the Hanseatic League in 1276, but was expelled, readmitted, and expelled again, for selfishness. The inhabitants became fervent Protestants, joined the Smalkaldic League in 1532, and in 1547 decisively defeated an Imperial army at Drakenburg. In two wars (1654, 1666) Bremen won its autonomy from Sweden, to whom the secularized diocese had been ceded (to form a duchy) in 1648, but it was not till 1741 that the independence of the city, which had been made a free Imperial town in 1646, was acknowledged fully. In 1810 Bremen was incorporated into the French Empire, but it became free in 1813 and in 1815 was made a member of the German Confederation. As a member of the German Empire, it remained outside of the *Zollverein* till 1888. A popular revolution in 1904 made the government of the city partly democratic, the liberal régime was confined in 1933 and 1934. The present constitution was adopted in 1854. The Duchy of Bremen was ceded by Sweden to Hanover in 1719.

Consult *Denkmale der Geschichte und Kunst der freien Hansestadt Bremen* (3 vols, Bremen, 1870), Reese, *Jahrbuch für Bremische Statistik* (Breslau, 1892), *Die Freie Hansestadt Bremen und Umgegend* (Bremen, 1893), V. Buppen, *Geschichte der Stadt Bremen* (Bremen, 1898), J. Bollmann, *Bremisches Staats und Verordnungsrecht* (Bremen, 1904).

BREMEN. A northwestern state of the German Empire, with the title, since 1815, of Freie Hansestadt Bremen. It consists of 18 communes, the bulk of which form a territory on both sides of the Weser, surrounded by the Prussian province of Hanover and the Grand Duchy of Oldenburg and containing the city of Bremen, which is 46 miles from the sea. The remaining territory consists of two detached towns, Vegesack, at the northern boundary of the main territory and on the right bank of the Weser, and farther north the port of Bremerhaven, 35 miles from Bremen City. The total area of the state is 25,640 hectares, or 90 square miles, of which Bremen city comprises about 10 square miles and Bremerhaven a little more than one square mile. There is some agriculture, and in 1912, 1402 hectares were under rye, 1538 oats,

1191 potatoes, and 2591 meadow. The population in 1871 was 122,402; in 1880, 156,723 (showing an increase of 27.3 per cent); in 1890, 180,443 (14.1); in 1900, 224,882 (21.9); in 1910 (census of December 1), 299,526 (28.5). Of the last number 259,658 (86.7 per cent) were returned as Protestants, 22,233 (7.42) Roman Catholics, and 14,472 (6.2) Jews. Bremen city had 247,437 inhabitants in 1910. Bremerhaven 24,165, and Vegesack 4236. Bremen entered the North German Confederation in 1866 and the German Customs Union in 1888. The state has a republican form of government under a constitution dated March 8, 1840, and revised Feb. 21, 1854, and Jan. 1, 1894. The sovereignty is vested in the Senate and the Convent of Burgesses (Bürgerschaft), the former the executive and the latter the legislative power. The Senate consists of 16 life members, each of whom is elected by the Convent, on presentation by the Senate. The Senate elects two of its members burgomasters, who direct its affairs alternately through a ministry of 12 members, each of whom is a senator. The Convent of Burgesses consists of 150 members chosen for six years by an unequal suffrage. The commerce and shipping of the state of Bremen are treated in the article on Bremen city.

BREMER, brä'mër, FREDRIKA (1801-65). A Swedish novelist, born near Åbo, Finland, and removed in 1805 to Sweden. Her father was an ironfounder, wealthy and somewhat stern, her mother severe and impatient, the child affectionate, passionate, and restless, misunderstood and hindered in development. Her first writing was youthful poetry in French, produced when she was eight years old. Nursery dramas and a journal followed, with foreign travel that left her "conscious of being born with powerful wings, but conscious of their being clipped." She turned to works of charity and, to increase her means for these, published anonymously a series of romances under the general title, *Sketches of Every-Day Life* (1828-48). The first of these was *Axel and Anna* (1828). A second volume, *The H. Family* (1829-30), was a sensational success, and subsequent volumes won her an international public. She passed two years (1840-51) in America. Her early novels excel in descriptions of every-day middle-class life. They have the charm of unaffected simplicity and quiet humor. Noteworthy among them are: *Axel and Anna* (1828); *The President's Daughters* (1834); *Nina* (1835); *The Neighbors* (1837); *The Home* (1839). Later novels disclose the reformer, advocating philanthropy, religion, and especially the equal rights of women. Of these, *Hertha* (1857) and *Synkonif* are the best. Her verse is unimportant. Of her books of travel, *Homes in the New World* (1853) contains her impressions of America. She died at Årsta, Dec. 31, 1865. An English life of Miss Bremer, with unpublished writings, appeared in 1868. Her best works have been translated into nearly all European languages. Consult Richard Petersen, *Fredrika Bremer* (Copenhagen, 1892).

BREMERHAVEN, brä'mër-hä'ven (Ger. port or haven of Bremen). A port on the Weser, about 10 miles from its mouth, founded by Bremen in 1827, on ground acquired from Hanover, and now a part of the Bremen state (Map: Germany, C 2). (See BREMEN.) There is quayside for the larger ships that come to Bremen, the harbor being excellently equipped

for this purpose. Workshops and dry docks of the North German Lloyd Steamship Company are situated here. Outside of shipping, shipbuilding is the chief industry. Pop., 1870, 10,000; 1880, 14,000; 1890, 16,000; 1900, 20,300; 1910, 24,165.

BREMER-TON, brēm'er-tūn. A city in Kitsap Co., Wash., 28 miles west by south of Seattle, on Puget Sound, and on the line of the Washington Steamship Company (Map: Washington, C 3). It is the seat of the Puget Sound navy yard, occupying 240 acres and valued, with its adjuncts, at \$10,000,000. Bremerton had the largest (at the time of its completion in 1912) dry dock in the United States, being 827 feet long and controlling a depth to the sea at mean low tide of 42 feet. It contains, also, a municipal park and playground on the water front, a public library, an athletic park, four theatres, and a skating pavilion. There are saw mills, machine shops, cigar and paint factories, a creamery, sheet-metal works, and an ice plant. Pop., 1910, 2993.

BREND'AMOUÉ, brēm'dā'mōor', RICHARD (1831-). A German wood engraver. He was born in Aix-la-Chapelle and studied engraving in Cologne. He is known chiefly as the founder, in 1856, of the well-known xylographic establishment in Dusseldorf, which was followed by similar establishments in other German cities. The illustrations for Zimmermann's *Oberhof*, after the drawings of B. Vautier (1863), and those of the eight frescoes by Alfred Rethel in the City Hall at Aix-la-Chapelle are among his most remarkable productions.

BREN'DAN, or **BREN'AINN**, SAINT, of Clonfert (484-577). An Irish saint and hero. He was born at Littis li or Staggum li, now Tralee, county Kerry, southwest Ireland; he was educated under monastic influences and became a priest, but, filled with a great desire to travel, went on a year's journey which took in the western and northern islands, e.g., the Hebrides, Shetland, and Faeroe Islands, and also Brittany. Returning, he went with a large party to the continent of Europe and to unknown lands, the smaller "Fortunate Isles." Returning from his second voyage, he founded the monastery in what is now Clonfert, in county Longford, central Ireland. Later he visited Iona and the mainland of Scotland. His reputation as a traveler being thus established, he was made the subject of a legend in which angels became his guides and strange experiences befell him. He died in 577, and his day in the calendar is May 16. Upon pre-Columbus maps "Saint Brendan's country," i.e., the scene of his supposed geographical discoveries, was just south of the island of Antillia and west of the Cape Verde Islands. Consult: B. C. Schröder, *Sanct Brandon* (Erlangen, 1871); John Lanigan, *Ecclesiastical History of Ireland*, vol. ii (Dublin, 1822); Francisque Michel, *Les voyages merveilleux de Saint Brandon à la recherche du paradis terrestre, légendes en vers du XII. siècle* (Paris, 1878); O'Donoghue, *Brendaniana* (Dublin, 1893); Gregory, *A Book of Saints and Wonders of Ireland* (London, 1907).

BREN'DEL, HEINRICH ALBERT (1827-95). A German animal painter. He was born in Berlin and studied at the Academy in that city with Krause and Burde, and in Paris under Couture and Palizzi. From 1854 to 1870 he lived chiefly at Barbizon, where he was on friendly terms with the famous painters who

lived there (see BARRIZON, PAINTERS OF), but his art remained distinctively German. In his delineation of cows and horses, and especially of sheep which are his favorite subjects, he showed deep understanding of the individuality of animals combined with high technical ability. Examples of his art are to be found in the National Gallery in Berlin and in the galleries of Hamburg, Weimar, Paris, and other European cities.

BRENDEL, KARL FRANZ (1811-68) A German musical critic, born at Stolberg-am-Harz, in Prussia. He was educated at the universities of Leipzig and Berlin, lectured on the history of music in Freiberg and Dresden, and in 1844 became editor in Leipzig of the *Neue Zeitschrift für Musik*, established by Schumann in 1834. At the same time he was appointed an instructor in musical history and aesthetics at the Conservatorium. He made the *Zeitschrift* the organ originally of the movement led by Wagner and Liszt, and, from 1861, of the Allgemeiner Deutsche Musikverein, founded in that year by himself, Liszt, and others for the purpose of reconciling hostile factions. He was president of the Verein until his death, and from 1856 to 1861 published a second periodical, *Anregungen für Kunst, Leben und Wissenschaft*. His publications include *Grundzüge der Geschichte der Musik* (1848), *Geschichte der Musik in Deutschland, Italien und Frankreich* (1852), *Die Musik der Gegenwart und die Gesamtansicht der Zukunft* (1864).

BRENEMAN, ABRAM ADAM (1847-) An American chemist and inventor, born in Lancaster, Pa. He graduated in 1866 at the Pennsylvania State College, and from 1869 to 1872 was professor of chemistry there. From 1875 to 1879 he was assistant professor of industrial chemistry at Cornell University, and from 1879 to 1882 professor. In 1882 he became a chemical expert, and a lecturer and writer on chemical subjects. He edited the *Journal of the American Chemical Society* from 1884 to 1893. Known as the inventor of a process, called by his name, for making iron non corrosive, he was an expert member of the municipal explosives commission of New York in 1906-09. His publications include *A Manual of Introductory Laboratory Practice* (1875, with G. C. Caldwell) and *A Report on the Fraction of Atmospheric Nitrogen* (1890).

BRENET, bre-nè', MICHEL (1858-) A French writer on the history of music. Her real name is Marie Bobillier. She was born, April 12, 1858, at Lunéville, lived some time at Strassburg and Metz, and after 1871 in Paris. Her works are the result of original and scholarly research. She has been a valuable and frequent contributor to the *Revue musicale*, *Tribune de St. Germain*, *Guide musical*, *Revue musicale italienne*, *Grande Encyclopédie*. Besides the special articles in these publications she wrote *Histoire de la Symphonie à orchestre jusqu'à Beethoven* (1882), *Orétry, sa vie et ses œuvres* (1884), *Jean d'Okéghem* (1893), *Claude Debussy* (1898), *Notes sur l'histoire du luth en France* (1899), *La jeunesse de Rameau* (1903), *Paléstrina* (1906), *La plus ancienne méthode française de musique* (1907).

BRENHAM, brén'am. A city and the county seat of Washington Co., Tex., 72 miles northwest of Houston, on the Gulf, Colorado, and Santa Fe, and the Houston and Texas Central railroads (Map Texas, D 4). Brenham

is the seat of the Blinn Memorial college, Sacred Heart Convent, and the Normal and Industrial College for Negroes, and has a public library, two parks of note, and fair grounds. It is in an agricultural, grazing, and cotton-raising region, and has cotton compresses, a cotton factory, a cottonseed oil mill, foundries, machine shops, a creamery, an ice factory, and manufactures of plows, wagons, soap, etc. Settled in 1844, Brenham was incorporated in 1866 and at present is governed under a charter of 1894, which provides for a mayor, elected every two years, and a city council. The water works are owned and operated by the municipality. Pop., 1890, 5209, 1900, 5968, 1910, 4718.

BRENKENHOF, brén'ken-höf, FRIEDRICH BALTHASAR SCHÖNBERG VON (1723-80) A Prussian statesman. He was born at Reichenburg, near Halle, and became equerry of Prince Leopold of Anhalt-Dessau. During the Seven Years' War he greatly facilitated the rapid marches of Frederick the Great by secretly and expeditiously furnishing the necessary supplies, chiefly horses, to the Prussian army. In recognition of his valuable aid, he was afterward invited to enter the service of Prussia and was entrusted with the task of restoring order and prosperity to the devastated eastern provinces. He rebuilt cities, founded settlements, encouraged the industries, and constructed numerous canals. After his death it was found that his accounts were irregular, and, in consequence, his estates were confiscated by the King, though afterward returned to the family. Consult Meissner, *Leben Brenkenhofs* (Leipzig, 1782).

BRENNAN, LOUIS See MONORAIL.
BRENNER, RICHARD (1833-74) A German explorer, born at Merseburg. During 1864 and 1865 he accompanied Baron von der Decken upon his expedition along the eastern coast of Africa. After the attack made upon the exploring party by the natives, Oct. 1, 1865, he made his way with great difficulty to Zanzibar and thence to Germany. On behalf of Von der Decken's family, and in association with Kinzelbach, he here organized an expedition for the purpose of ascertaining the fate of the Baron (1866-68). He afterward visited the southern part of the Galla country, of which region he was the first to prepare a chart. In 1870 he undertook an extensive commercial tour to Aden, the Persian Gulf, and the coast of East Africa.

BRENNER, VICTOR DAVID (1871-) An American sculptor and medalist. He was born of American parentage in Slavy, Russia, and came to the United States in 1890. He worked as a die cutter for several years, and in 1898 went to Paris, where he studied under Louis Oscar Roty. He received awards for his exhibits at the Paris Exposition and Salon of 1900, at the Pan-American Exposition in Buffalo in 1901, and at the Louisiana Purchase Exposition in St. Louis in 1904. Besides many medals he designed the seal of the New York Public Library and of the Fine Arts Federation of New York, and the Lincoln cent, and executed portrait medals of W. M. Everts, Collis P. Huntington, Whistler, Carl Schurz, Theodore Roosevelt, and others. He wrote *The Art of the Medal* (1910). Among his sculptures are the bust of Charles Eliot Norton (Fogg Museum, Harvard University). He is also represented by medals in the Luxembourg, the Munich Glyptothek, and the Metropolitan Museum, New

York. Consult Torrér, *Dictionary of Medalists* 1900).

BRENNER PASS. A mountain pass of the Tirol, Austria, the lowest over the main ranges of the Alps (q.v.). It is on the route joining Innsbruck with Bozen (Map: Austria, i, 3). The summit, which is 4470 feet above the sea, and 25 miles south of Innsbruck, lies on the watershed between the Black and Adriatic seas. It links the middle courses of the Inn and Adige, and bridges the broad double line of the central Alps. The Brenner Pass was in use by the Romans and other peoples 2000 years. It was made available for carriages in 1772, and in 1807 a railway was opened which passes over 67 bridges and through 22 tunnels (one of which is over 2800 feet long). It connects the railway systems of Germany and Austria with that of Italy and is the shortest route between central Germany and Italy. The railway was begun by the Austrian government when Venetia belonged to the Austrian Empire, with the view of facilitating the military operations and of restoring the commercial prosperity of Venice by making it the port of south Germany. The prosecution of the work was not arrested by the political changes which took place. A liberal commercial treaty between Austria and Italy, binding the two countries together in community of interest, restored the natural state of things, with which political animosities had long interfered. The pass takes its name from the village of Brenner at its summit. The most picturesque portions lie between Innsbruck and Gossensass. The steepest gradient is 1 in 40. The distance from Innsbruck to Bozen in a direct line is only 52 miles, but by the windings of the road or of the railway it is much increased. Consult Wanka von Rodlow, *Die Brennerstrasse* (Prague, 1900); Riehl, *Die Kunst an der Brennerstrasse* (Leipzig, 1908).

BRENNGLAS, brén'glas, ADOLF. A pseudonym of Adolph Glassbrenner (q.v.).

BRENTIA COMITIS. See BRAINE-LE-COMTE.

BRENN'NUS (Celt. *bréninn*, king, or Welsh and Ir. *bran*, raven). The Latin form of a Celtic name borne by several Gallic chieftains. 1. The most famous Brennus was that leader of the Gauls who about 390 B.C. crossed the Apennines and, hurrying through the country of the Sabines at the head of 70,000 men, encountered and overthrew the Roman army on the banks of the Allia. Had the barbarians immediately followed up their advantage, Rome might have been obliterated from the earth; but instead of doing so, they abandoned themselves to drunken revelry on the battle field, and gave the Romans time to fortify the Capitol, whither were removed all the treasures and holy things of the city, and to send the women and children to Veii (q.v.). When Brennus entered the gates he found that all the inhabitants of the city had fled, with the exception of the women and children and aged Senators, the last of whom, with pathetic heroism, had resolved not to survive the destruction of their homes; and so the chief among them, clothed in their robes of sacerdotal or consular dignity and sitting in the curule chairs, awaited the approach of their enemies and suffered death in majestic silence. Brennus, having plundered the city, now besieged the Capitol for six months. During the beleaguement occurred the famous night attack, which would have been successful had

not the cackling of the geese kept in Juno's temple awakened the garrison. At length, however, the Romans were compelled to enter into negotiations with the besiegers. They offered 1000 pounds of gold for their ransom, which was agreed to. According to Polybius (i, 6; ii, 18), Brennus and his Gauls returned home in safety with their booty; but the rather mythical Roman traditions affirm that, just as the Gauls were leaving the city, Camillus (q.v.), who had been recalled from banishment and appointed dictator, appeared at the head of an army, attacked them, and, in two bloody battles, slew them to a man. (Consult Livy, v, 33-49; Plutarch, *Camillus*, xvii, xxii, xxvii.) The whole story of Brennus is evidently a mere legend, based upon facts which the Roman historians, from patriotic motives, falsified. It is probable that the Gauls in reality held possession of parts of Italy for some time, and that their great rout by Camillus is pure fiction.

2. Another BRENNUS, who occupies a conspicuous place in history, was the Gallic chief who invaded Greece, 279 B.C., at the head of 150,000 foot and 61,000 horse. After desolating Macedonia, he forced his way through Thessaly to Thermopylae (278 B.C.). The Grecian army resisted for a time, but fled when he assailed them from the rear, by the same path which had caused the death of Leonidas (q.v.). Brennus rushed on with a division of his great host to Delphi, which he had resolved to plunder; but the Delphians, having taken up a very advantageous position on some rocks, resisted his further progress. Assisted by an earthquake and a terrible storm, and, according to reverential tradition, by the supernatural help of Apollo, they utterly routed the Gauls, who fled in dismay. Brennus was taken prisoner and killed himself in despair.

BRENT, CHARLES HENRY (1862-). An American. Protestant Episcopal bishop. He was born in Newcastle, Ontario; graduated from Trinity College, Toronto, in 1884; and, ordained a priest three years later, was settled first in Buffalo, N. Y., then (1888-1901) in Boston. At the end of this period he was elected Bishop of the Philippine Islands; he declined the bishopric of Washington in 1908. He lectured at the General Theological Seminary in 1904 and at Harvard in 1907, and for several years was one of the editors of *The Churchman*. In the Philippines he identified himself prominently with the crusade against opium, serving in 1911 as chairman of the American delegation to the International Opium Conference at The Hague. Besides his Seminary and Harvard lectures, published as *Adventure for God* (1905) and *Leadership* (1908), he wrote: *The Consolations of the Cross* (1902); *Liberty and Other Sermons* (1906); *A Glorious Ministry* (1910); *The Sixth Sense* (1911).

BRENTA (anciently, Lat. *Brinta*, or *Brentesia*). A river of north Italy. It issues from Lake Caldcazzoz in the Austrian province of Tirol, flows through the Sugana valley, then south through Venetia, finally turning eastward, and empties into the Gulf of Venice (Map: Italy, F 2). It originally emptied at Fusina, but to prevent inundations the main stream was diverted at Dolo southward into the Gulf of Venice just below Chioggia, while the old channel has been transformed into a canal between Venice and Padua. Below Bassano, where the Venetian plains begin, the river flows between

dikes The total length of the Brenta is 106 miles, of which 56 are navigable

BRENTANO, brén-táno, CLEMENS (1778-1842) A German novelist and poet of the Romantic school He was born in Ehenbreitstein, studied in Jena, lived in Frankfurt, Heidelberg, Vienna, and Berlin, and for a time at a cloister in Dülmen, near Münster (1818) Thence he went to Regensburg, Munich, and Frankfurt. He died in Aschaffenburg, July 28, 1842 Brentano's most characteristic poem is his *Romanzen vom Rosenkranz* (1852), a collection of subtle, mystic, and religious allegories, in which history, biography, legend, admiration for the Catholic church, and many other elements are cast into melodious form, while the drama *Die Gründung Prags* (1815) is a fantastic and bizarre production of undeniable power His best work is in short stories, particularly in his fairy stories The simplicity of his *Geschichte vom braven Kasperl* (1817) and of *Gockel, Hinkel und Gockeleia* (1838) is in pleasant contrast to the mystic romanticism of some of his other work His most enduring contribution to literature is the compilation, with Arnim, of German folk songs in *Des Knaben Wunderhorn* (3 vols, 1806-08) He was an erratic member of a whimsically brilliant family His grandmother, Sophie La Roche, had been a close friend of Wieland, his mother, Maximiliane, figures in Goethe's life, as does his sister, Bettina von Arnim (qv)

BRENTANO, FRANZ (1838-). A German philosopher, born in Maunenberg He was for a time a professor of philosophy in Würzburg and from 1874 to 1880 in Vienna His works comprise *Psychologie des Aristoteles* (1867), *Psychologie vom empirischen Standpunkte* (1874), *Neue Ratsel* (1878), *Vom Ursprung sittlicher Erkenntnis* (1889, Eng. trans., 1902), *Untersuchungen zur Sinnespsychologie* (1907), *Aristoteles und seine Weltanschauung* (1911), *Aristoteles Lehre vom Ursprung des menschlichen Geistes* (1911), *Von der Klassifikation der Psychischen Phänomene* (1911)

BRENTANO, LORENZ (1813-91) A German-American politician and editor, born in Mannheim After study in Heidelberg and Freiburg, he began legal practice, entered public life, and in 1848 was elected to the National Assembly at Frankfurt In 1849 he was placed in control of the Provisional Government of Baden, but soon fell under suspicion among his fellow revolutionists, and in 1850 fled by way of Switzerland to America He established *Der Leuchtturm*, a German antislavery journal, in Pottsville, Pa., and from 1862 to 1867 was editor in chief of the *Illinois Staatszeitung* in Chicago He was appointed to the American consulate at Dresden in 1872 and in 1876 was elected to Congress As editor of the *Staatszeitung*, he greatly aided the Federal cause during the Civil War period

BRENTANO, LUDWIG (1844-) A German political economist He was born in Aschaffenburg, Bavaria, studied at the universities of Dublin, Heidelberg, Munich, Würzburg, and Göttingen, and with Ernst Engel, the statistician, made an investigation of the English trades unions He was professor of political economy successively in Breslau (1873), Strassburg (1882), Vienna (1888), Leipzig (1889), and Munich (1891) His publications include *Die Arbeitergilden der Gegenwart* (2 vols,

1871), *Das Arbeitsverhältnis gemäss dem heutigen Recht* (1877), *Der Arbeiterversicherungszwang, seine Voraussetzungen und seine Folgen* (1881), *Ueber das Verhältnis von Arbeitslohn und Arbeitszeit zur Arbeitsleistung* (2d ed., 1893), *Agarpolitik* (1897), *Erbschaftspolitik* (1899), *Die Schrecken der überwiegende Industriestaat* (1901), *Die Wirtschaftliche Leben des Christlichen Altersums* (1902), *Die Entwicklung des Wertlehre* (1908), *Die deutsche Getreidesolle* (1911)

BRENTFORD The county town of Middlesex, England, on the Brent, at its confluence with the Thames, 10½ miles west of Waterloo Station, London, and where the Thames is crossed by a bridge leading to Kew It has extensive manufactories, among them being gin distilleries, breweries, soap works, saw mills, etc., and there are many market gardens in the vicinity Pop., 1891, 13,738, in 1901, 15,171, 1911, 16,571 Here Edmund Ironsides defeated the Danes in 1016, and in 1642 the Royalists, under Prince Rupert, defeated the Parliamentarians, under Colonel Hollis There are frequent allusions to it in English literature Consult Watts, "Old Brentfordtown," in the *Art Journal* (London, 1901)

BRENTON, WILLIAM (?-1674) An American colonist, prominent in the early history of Rhode Island He emigrated from England to Massachusetts in 1634 but removed to Portsmouth, R I., five years later, and in 1639 assisted in the founding of Newport He was Deputy Governor of Portsmouth and Newport, R I., from 1640 to 1647 and again from 1662 to 1665, was president of Providence Plantations from 1660 to 1662, and was Governor of Rhode Island and Providence Plantations, under the new charter of 1663, from 1666 to 1669 Brenton's Point, and Brenton's Reef in Narragansett Bay were named for him

BRENZ, biénts, JOHANN (1490-1570) A German reformer Under the influence of Luther he reorganized his church at Hall, Swabia, but at the time of the Smalkaldic War, in 1546, he was obliged to flee to Württemberg He was appointed minister of the Collegiate Church of Stuttgart in 1553, and is said to have been the first exponent of the Reformation there In the controversies between Zwingli and Luther he took the side of the latter, and with others wrote the famous *Syngramma Sacrum* (1525) He was a writer of great ability and popularity One of his teachings was that the body of the Lord is everywhere present, hence his followers were called "Ubiquitarians" Contrary to the usual opinions of the time Brenz did not favor the killing of Anabaptists and other heretics who did not belong to his party His works appeared in 8 vols at Tübingen (1576-90) Consult his life by Hartmann and Jäger (2 vols, Hamburg, 1840-42), and Kohler, *Bibliographia Brenziana* (Berlin, 1902)

BRERA, brá'ra (brera for bréda, from Lat. *prædium*, the estate, manor) The Palace of Science, Letters, and Arts in Milan It was erected by Richini for a Jesuit college in 1651 It contains a library of 300,000 volumes (founded in 1770), a collection of 50,000 coins, a magnificent collection of paintings (confined chiefly to Italian artists, however), an archaeological museum, and a good collection of casts from antique works In its courtyard stands Canova's bronze of Napoleon I as Roman Emperor

BRESCIA, brě'sha (anciently, Lat. *Briata*, founded by the Etruscans). An episcopal city of Lombardy, Italy (Map: Italy, E 2), capital of the province of Brescia, 52 miles east of Milan. It is situated in a fertile plain at the foot of the Alps, on the Mella and the Garza, and is dominated by a citadel known as the *Falcoma d'Italia*, that overlooks it from the rocky steepes on the north. Of the 65 churches that prospered at the time of the Venetian Republic, less than half are used for worship to-day. The old cathedral generally called *La Rotonda*, from its massive dome structure, dates partly from the ninth century, partly from the twelfth. The new cathedral, begun in 1604, but not completed until the nineteenth century, is one of the best examples of seventeenth-century architecture. The magnificent city hall, called *La Loggia*, the exterior of which is covered with ornamentation, was begun in 1489, on the ruins of a temple of Vulcan. The *Broletto* is a massive twelfth-century building, once the city hall, but now containing the courts of justice.

The Roman museum occupies a Corinthian temple excavated in 1822 and originally erected by Vespasian in 72 A.D. It is exceedingly picturesque and contains many valuable Roman antiquities. The Medieval Museum also contains numerous treasures. In the Palazzo Tozio, bequeathed to the town by Count Tozio, and in the Palazzo Martinengo, are important collections of ancient and modern paintings, engravings, and statuary. The library, bequeathed to the town in 1760 by Cardinal Quirini, has over 100,000 bound volumes and 1500 manuscripts, among them a ninth-century Book of the Gospels, a tenth-century Harmony of the Gospels by Eusebius, and a Dante manuscript. The number of works in the town, both *in fresco* and in oils, by Alessandro Bonvicino, called *Il Morretto*, is accounted for by the fact that he was born and passed most of his life in Brescia.

The city has many charitable institutions, a street railway, a theatre, a lyceum, several gymnasia, botanical gardens, and various academics, among them the *Accademia de' Filarmenici*, which is one of the oldest in Italy. Water from Membiano is distributed by an aqueduct to 72 public and 400 private fountains. There are factories for the manufacture of iron, one of the government works for small arms being here located; also mills for the spinning, weaving, and working up of silk, flax, cotton, and wool. There are also oil and paper factories. The trade in all these articles, and in wine, particularly *vino santo*, is very extensive, and there is a large general commerce, Brescia being a centre of transportation by both rail and highway. Pop. (communal), 1894, 67,700; 1901, 70,614; census of June 10, 1911, 83,338. The Celtic inhabitants of the ancient Brixia were allied with the Romans when Hannibal crossed the Alps. Under Cusar it became a Roman town; it was destroyed by the Huns, but soon rebuilt, and afterward passed through the hands of the Ostrogoths, the Lombards, Charlemagne, and the Germans. It was a leader among the Lombard cities which opposed Frederick Barbarossa, and in 1428 it came into the possession of Venice. At the beginning of the sixteenth century Brescia was one of the wealthiest cities of Lombardy; but it never recovered its former importance after being sacked and burned in 1512 by the French under Gaston de Foix. In

the rising of 1848 against Austria the citizens of Brescia took an active part, and after the battle of Custoza and the capitulation of Milan, shared the fate of other Lombard cities. In March, 1849, it was the only large city of Lombardy which rebelled, and, after the defeat of the Piedmontese at Novara, was bombarded and taken by Haynau and had to pay an indemnity of over \$1,200,000. In the War of 1859 it stood again by the side of Piedmont, and in 1860, with the rest of Lombardy, became a part of the Kingdom of Italy.

BRESLAU, brě'slon (Pol. *Wrocław*, also *Wratislavia*, *Bracław*, ML. *Wratislavia*, from King Wracislaw or Wratislaw). The capital of the province of Silesia, Prussia, and third royal residence, situated at the confluence of the Ohlau and Oder, 202 miles by rail southeast of Berlin, in lat. 51° 7' N. and long. 17° 2' E. (Map: Prussia, G 3). The Oder divides it into two parts, which are connected by numerous handsome bridges. It consists of the inner or main town and five suburbs, called the Ohlau, Sand, Oder, Nikolai, and Schweidnitz suburbs. The ancient fortifications have been converted into beautiful promenades, and the moat has been transformed into an ornamental sheet of water. The streets of the new portion of Breslau are spacious and regular, and the houses stately and handsome, affording a pleasant contrast to the sombre, massive structures and narrow streets of the old town. The city has many churches, the most remarkable being the Protestant church founded in 1250 and dedicated to St. Elizabeth, with a steeple 300 feet in height (the highest in Prussia), and a splendid organ, and the Roman Catholic cathedral, founded in 1148, containing many works of art in sculpture and painting. Among the other churches should be mentioned the church of the Holy Cross (thirteenth and fourteenth centuries), the church of St. Mary Magdalen (fourteenth century), the church of St. Michael (1871), and the fine synagogue. Other noteworthy buildings are the town hall (*Rathaus*), begun in the fourteenth century and lately restored; the university (1728-36), the civic hall (*Stadthaus*), and the government offices. Breslau is the largest city of Prussia, after Berlin and Cologne, which in 1910 surpassed it by less than 2500. Its proximity to the Russian frontier makes it a highly important trading centre in raw products. It holds three annual fairs, besides a number of special markets, e.g., in leather, horses, and cattle. Its position in the centre of manufacturing districts, and its railway connections with all the important cities, in addition to the facilities of communication which the Oder affords, increase still further its commercial importance. It has manufactories of linen, woollens, cotton, silks, lace, jewelry, metal wares and machinery, earthenware, soap, alum, starch, etc., and upward of 100 distilleries, and a trade in corn, coal, metals, timber, hemp, and flax. The city has a municipal council of 102 members, who elect an executive board of 27 for the practical administration of the municipal affairs. (See PRUSSIA, *Local Government*.) The municipality owns and operates two gas and two electric lighting plants, supplying all public and private buildings. The water works are also in the hands of the municipality. The street railways are private undertakings. Breslau has an excellent system of sewerage and sewage farms, on the general plan of those of Berlin, which

have proved so successful. Educational institutions are numerous and include a university (founded 1702) with a library containing over 312,000 volumes, six high schools (three belonging to the city), a good system of public elementary schools, a municipal library of 150,000 volumes, and two museums. The city is richly provided with hospitals and charitable institutions. In addition to the university clinic, there are two hospitals and an asylum under municipal control, as well as four orphan asylums. About 60 per cent of the inhabitants are Protestants, and about 35 per cent Roman Catholics. The population in 1910 was 512,105, as compared with 470,751 in 1905, 335,186 in 1890, 272,912 in 1880, and 171,926 in 1867.

Breslau is a city of Polish origin. In the thirteenth century it was an important Silesian city. It passed from the suzerainty of Poland in 1235 to Bohemia and in 1527 to Austria, from which it was taken by Frederick II of Prussia in 1741. Sixteen years afterward it was captured by the Austrians, after a bloody battle, but was retaken by Frederick in about a month. In 1807 it surrendered to the French. Soon after its fortifications were demolished. Here was issued in 1813 the proclamation by which Prussia entered the War of Liberation against Napoleon and it was vitally concerned in the Leipzig campaign. Consult Korn, *Breslauer Urkundenbuch* (Breslau, 1870), Städe, *Breslau* (Hamburg, 1895), Wutke, *Die Breslauer Messe* (Hamburg, 1895).

BRESSANI, brēs'sānē, FRANCESCO GIUSEPPE (1612-72). An Italian Jesuit missionary among the Indians of Canada. In 1644 he was sent to the Huron country, but was captured and tortured by the Iroquois. After great suffering he was sent to the Dutch settlements at Fort Orange (Albany), whence he was ransomed for a large sum. He returned to France, but came back to resume his missionary work in 1645 and labored among the Hurons until 1650, when, broken in health, he returned to Italy. He published *Relazione dei missionari della compagnia dei Gesuiti nella Nuova Francia* (1653), a French translation of which appeared in Montreal in 152, Eng trans in Thwaites, *Jesuit Relations*, especially vols xxxviii, xxxix, xl (Cleveland, 1898).

BRESSAY, brēs'sā. One of the Shetland Islands (qv), Scotland, east of Mainland, separated from Lerwick by Bressay Sound (Map Scotland, G 1). Area, 12 square miles. It supplies the Shetland Islands with slates. The population in 1911 numbered 641, and fishing is the chief occupation. East of Bressay, separated by a narrow and dangerous sound, is the most remarkable of Shetland rock phenomena, an islet called Ness, surrounded by perpendicular cliffs 300 to 500 feet high, culminating in the Noup, a fine peaked headland 600 feet high. Bressay and Ness are important breeding grounds for Shetland ponies.

BRESSLAU, brēs'lau, HARRY (1848-). A German historian. He was born at Dannenberg, Hanover, and studied history at the universities of Göttingen and Berlin. In 1870 he was appointed teacher at the *Realschule* of the Jewish congregation in Frankfurt-on-the-Main, where he remained until 1872, when he was called to the Andreas Realschule at Berlin, in the same capacity. Simultaneously he became private lecturer at the Berlin University and was appointed extraordinary professor at that uni-

versity in 1877. He was appointed a member of the central directorate of the Monumenta Germaniae Historica in 1888, and also became editor (1888-1903) of the *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde*. His appointment to the chair of history at Strassburg came in 1890, and from 1904 to 1905 he was rector of the university. Among his numerous publications are the following: *Diplomata Centum* (1872), *Jahrbücher des deutschen Reichs unter Kaiser Heinrich II*, vol II (1875), *Jahrbücher des deutschen Reichs unter Konrad II* (2 vols, 1879-84), *Zur Judenfrage, Sendschreiben an Heinrich von Treitschke* (2d ed., 1880), *Handbuch der Urkundenlehre*, vol I (1889, 2d ed., 1912), *Das Tausendjährige Jubiläum der deutschen Selbständigkeit* (1912).

BREST (anciently, Lat *Gessoriate*, according to others, *Gessorivates*, or *Bivates Portus*). A strongly fortified seaport of Brittany, France, in the department of Finistère, at the mouth of the Penfeld, on the Bay of Brest, 389 miles west of Paris by rail (Map France, N, A 4). Le Goulet, the entrance to the bay, scarcely a mile wide, is protected by powerful batteries. The harbor, one of the chief naval stations of France, contains military and naval ports, fully equipped with floating and graving docks, quays, piers, and a breakwater, completed in 1876 at a cost of 22,500,000 francs (\$4,500,000). A modernized citadel, whose foundations date from the thirteenth century, dominates the city and harbor, which are also protected by batteries. The city itself is old, duty, and has steep, crooked streets. The public institutions consist of a botanical garden, lyceum, naval schools, naval library, marine and civil hospitals, and a free library. The Cours Dajot, a beautifully wooded promenade, overlooks the commercial port and breakwater. It has an active trade in wine, coal, timber, tar, fertilizers, and shell food as imports, and flour, fruit, and vegetables as exports. The industries are sardine and mackerel fishing, mills, foundries, engineering works, breweries, and manufacturing of candles, chemicals, boots, shoes, and linen. Brest has submarine telegraphic communication with the United States, which is represented by a consular agent. Brest came into national importance when it was converted into a great fortress by Vauban towards the close of the seventeenth century. Since then it has been considerably strengthened. The population consists largely of naval and seafaring people. Pop., 1906, 85,204, 1911, 90,540. Consult *L'Annuaire historique et statistique de Brest* (Brest, 1899), Kernér's, "Contribution à l'histoire de la ville et du port de Brest" in *Soc Académique de Brest Bull* (Brest, 1910-12).

BREST-LITOVSK, brēs't/lyā-tōfēsk' (Russ., Lith. *Brest*, Pol. *Breść-Litewski*, anciently *Berestyc*, *Berestow*, 'the elm city,' from *berestā*, elm). A first-class fortress and the capital of a district in the government of Grodno, Russia, situated 131 miles south of Grodno, at the junction of the Mukhavetz and the Bug (Map Russia, B 4). Pop., 1908, 47,604, including 27,000 Jews. Brest-Litovsk, one of the oldest Slav towns, belonged to Poland till 1795. At the Church congresses held here in 1590, 1594, and 1596, the union of the Eastern and Western churches, recognizing the supremacy of the Pope, but retaining the Eastern ritual and the Slavonic language in worship, was proclaimed, notwith-

standing the protests of the Russian and Greek representatives. It is the seat of Armenian and Greek Catholic bishoprics. Although but little manufacturing is carried on, the town is of considerable commercial importance, situated as it is on the inland water way from the Baltic to the Black Sea, and at the intersection of the railroads connecting Odessa with Königsberg and Moscow with Warsaw. There is trade in grain, leather, hemp, flax, and wood. Two fairs are held annually.

BRETAGNE, *bre-tā'ny*. See **BRITTANY**.

BRETEUIL, *bre-tē'y*, LOUIS CHARLES AUGUSTE LE TONNELIER, BARON DE PREUILLY (1733-1807). A French diplomat and statesman. He was appointed, in 1758, after several years of military service, envoy to the Elector of Cologne, and Minister to Sweden in 1769. Subsequently he was also Minister at Vienna and Naples. In 1783-87 he was Minister of State, a steadfast royalist, opposed to all concessions to the Third Estate. In 1789 he was appointed to succeed Neckar, but his ministry was brought speedily to a termination by the capture of the Bastille. Having counseled the King to escape across the frontier and seek foreign aid, he himself withdrew to Solothurn, Switzerland, where he was appointed royal agent to treat with foreign powers regarding the restoration of the monarchy. In 1802 he was permitted to return to France, but thenceforth took no part in politics.

BRETHREN, BOHEMIAN. The name of a religious society which was first instituted in Bohemia about the middle of the fifteenth century. It was originally composed of remnants of the Hussites. Dissatisfied with the conduct of the Calixtines (see **HUSSITES**) they went, in 1453, to the borders of Silesia and Moravia, where they settled. Here they dwelt in separate communities and were called Brothers of the Rule of Christ. Their adversaries often confounded them with the Waldenses and Picards, while, on account of their being compelled during persecutions to hide in caves and solitary places, they were also called cave dwellers (*Grubenheimer*). In spite of oppression, such was the constancy of their faith and purity of their morals that they became profoundly respected, and their numbers greatly increased. The chief peculiarity of their creed was the denial of the Catholic doctrine of transubstantiation; but they rejected tradition generally, and professed to found their tenets only on the Bible. Their ecclesiastical constitution and discipline—of which the Lutheran reformers spoke highly—was a close imitation of that of the primitive Christian communities. Under the conviction that religion should consciously penetrate and characterize the entire life of men, they extended ecclesiastical authority over even the details of domestic life. Their chief functionaries were bishops, seniors and consensors, presbyters or preachers, adiles, and acolytes. The nucleus of the sect was the following of Peter Chelozicky, a layman of the nobility. To them Rokyzana, the Utraquist leader, sent Gregor in 1457, and he led them when persecution broke out to Kunwald, in Bohemia, near Königgrätz, whence, however, they were driven to the mountains. Gregor died in 1474. Their next great man was Luke of Prague, who brought them into literary contact with the Waldenses. The latter translated some of their writings, and these translations have frequently been taken for original Waldensian works; for the Bohemian Brethren had

literary intercourse with the Waldenses, but the differences between them prevented union. They had also ecclesiastical connection, for their bishop, Matthias of Kunwald, was consecrated by a bishop of the Bohemian Waldenses. It was against their principles to engage in war; and having on several occasions refused to take up arms, they were at last deprived of their religious privileges. The result was that in 1548 about 1000 of the Brethren removed to Poland and Prussia. The contract which these exiles entered into with the Polish reformers at Sandomir, April 14, 1570, and still more the religious peace concluded by the Polish States in 1572, secured their toleration; but subsequently, in consequence of the persecutions of King Sigismund III., they united themselves more closely to the Protestants, though even at the present day they retain something of their old ecclesiastical constitution. The Brethren who remained in Bohemia and Moravia obtained a little freedom under the Emperor Maximilian II and had their chief seat at Fulnek, in Moravia. In the seventeenth century a number removed into Hungary, but during the reign of Maria Theresa were coerced into Catholicism. The Thirty Years' War, so disastrous to the Bohemian Protestants, entirely broke up the societies of the Bohemian Brethren; but afterward they united again, though in secrecy. Their exodus about 1722 occasioned the formation, in Lusatia, of the *United Brethren*, or *Herrnhuters*. See **MORAVIANS**.

BRETHREN, PLYMOUTH. See **PLYMOUTH BRETHREN**.

BRETHREN, WHITE. A sect of the fifteenth century, that sprang up in the Italian Alps. Their leader claimed to be Elias the prophet. They were clad in white and carried crucifixes from which blood appeared to come. The leader, who appears to have left no name, prophesied the destruction of the world and for a time had great success; but Boniface IX seized the prophet and burned him at the stake, and within a year the sect passed out of existence.

BRETHREN OF THE LORD, THE (Gk. *ἀδελφοὶ τοῦ Κυρίου*, *adelphoi tou Kyriou*). A term which occurs but once in the New Testament (1 Cor. ix. 5), though the phrase "the Lord's brother" is applied once to James (Gal. i. 19), and the general term "his (my) brethren" is used several times in the Gospels (Mark iii. 31; Matt. xii. 46, 50; xxviii. 10, John ii. 12, vii. 3, 5, 10; xx. 17) and once in Acts (i. 14).

In view of these passages that refer apparently to actual brothers and sisters of Jesus, giving the names of the former as James and Joscs (Joseph) and Judas and Simon (Mark vi. 3 and Matt. xiii. 55), there has existed, ever since the Patristic age, considerable controversy regarding the degree of consanguinity involved in the above term.

Three views have obtained: 1. The Helvidian—first asserted by Tertullian (c.208 A.D.) and restated by Helvidius (c.380 A.D.)—that these brethren were later sons of Mary by Joseph, the reputed father of Jesus. 2. The Epiphonian—first appearing in the second century apocryphal books, the Gospel of Peter, and the Protevangelium of James, and chiefly supported by Epiphanius (c.370 A.D.)—that these brethren were sons of Joseph by a former marriage. 3. The Hieronymian—promulgated by Jerome (c.380 A.D.)—that these brethren were cousins

of Jesus, being sons of Alphæus (Clopas), the husband of a sister of Mary.

Of these views, the first is fatal to, while the latter two sustain, the theory of the perpetual virginity of Mary. The last view is generally rejected by modern scholars, as between the first and the second views the scholarship of today is practically balanced. Consult for the first view, J. B. Mayor, Introduction to his *Commentary on James* (1897), for the second view, J. B. Lightfoot, Excursus in his *Commentary on Galatians* (1887), for the third view, Mill, *The Accounts of our Lord's Brethren* (1843). See JAMES.

BRETIGNY, bré-tî-nî' A village of France, in the department of Eure-et-Loir, about 6 miles southeast of Chartres, on the railway between Paris and Orleans. At Bretigny, on May 8, 1360, Edward III. concluded a treaty with France, by which the French King, John II, was released from captivity in England, on agreeing to pay 3,000,000 ecus of gold (about \$8,000,000) for his ransom. Edward renounced his pretensions to the crown of France, his title to Normandy, Anjou, Maine, and Touraine, and the suzerainty over Brittany and Flanders, but was confined in his possession of Guenne and Gascony, and received in addition Poitou, Saintonge, Calais, and a number of other places. See FRANCE, and consult LAVISSE, *Histoire de France*, vol. IV, part 1, pp. 161-166 (Paris, 1902).

BRETON, bré-tôn', GILLES LE (?-1550) A French architect. He was employed in the work of transforming the old conventual buildings at Fontainebleau (qv) into a palace. There is some doubt as to his exact functions, but Palustré attributes to him the design of the Cour Ovale, Porte Dorée, both chapels (Trinité and St. Saturnin), and the Galerie Henri II, making him thus the author of the most interesting parts of the palace before the time of Henri IV. He died in 1550, during the reign of Henri II.

BRETON, JULES ADOLPHE (1827-1906) A French figure painter of peasant subjects, also an author of note. He was born at Courrières (Pas-de-Calais), and studied under Devigné at Ghent, Wappers at Antwerp, and Drolling at Paris. Beginning as an historical painter, he soon found his forte in depicting the life and surroundings of the peasants of his native Artois and later of Brittany. Breton's art occupies a middle position between French classic tradition and the poetic realism of a Millet. He is greatest in landscape. Although his figures are not free from a certain academic pose, and both figures and landscape lack rugged strength, he charms by the tender sentiment of his works. Among his principal ones are "Blessing the Grain" (1857), and, most celebrated of all, the "Return of the Gleaners" (1869), both in the Luxembourg, Paris. "Planting a Calvary" (1859, Lille), "Women Weeding" (1861), "The Potato Harvest" (1868), "At the Fountain" (1872, Quimper), "The Reaper" (1877, Luxembourg), "The First Communion" (1881), "Song of the Lark" (1885, Art Institute, Chicago), "The Pardon of Kergoat" (1891, Metropolitan Museum, New York), "Twilight Glory" (1900), "Love and the Wild Lily" (1905). An author of note, he wrote poetry and prose with equal facility, his literary works including *Les champs et la mer*, poems (1875), *Jeanne*, a poem (1876), *La vie*

d'un artiste (1890) and *Un peintre paysan* (1895), the last two autobiographical in character. He received many medals and was a commander of the Legion of Honor (1889). Consult besides the works cited above, Vachon, *Jules Breton* (Paris, 1899), Monod in *Art et décoration* (ib., 1906).

BRETÓN DE LOS HERREROS, bré-tôn' dâ lôs a-r-ré-rôs, DON MANUEL (1796-1873) A popular Spanish poet and dramatist. He was born at Quel, in the province of Logroño, was educated in Madrid, and after eight years of military service held several positions under the government, but always lost them on account of his free expressions of liberal opinion. His first essay in the drama was *La vejez vueela*, which in 1824 was produced with great success. Other plays followed in rapid succession, numbering altogether more than 150, partly original, partly adaptations from earlier Spanish classics, and partly translations from the Italian and French, some of which were very popular. They form a history of Spanish customs during the first half of the nineteenth century. The appearance of his comedy *Marcela* (1831) was the beginning of the invasion of romanticism into Spanish dramatic art. His own favorite among his dramas was *Muñete y verdades*, which appeared in 1837, the year of his election to the Royal Spanish Academy, whose secretary he became later. His best and most ambitious play is the *Escuela del matrimonio* (1852), an admirable picture of average Spanish social life, with just the needed touch of irony to relieve it. His lyrical and satirical poems please by their elegance, vivacity, and piquancy. Had he been content to write less, he might have left a more enduring fame. His collected works, edited by himself, appeared in Madrid (1850-52) in 5 vols. A better edition is that of Bretón y Orozco (5 vols., Madrid, 1883). His *Obras Escogidas*, selected by himself, appeared in 2 vols., in Paris, shortly after the aforesaid Madrid edition of 1850-52. For a detailed study by an intimate friend, consult the Marqués de Molins, *Bretón de los Herreros* (Madrid, 1883). Consult Pifeyro, *El Romanticismo en España*, *Le Gentil*, *Le poète Manuel Bretón de los Herreros et la société espagnole de 1830 à 1860* (Paris, 1909).

BRETON LITERATURE The Breton, or Armorican, language belongs to the British subdivision of the Celtic family of languages (See CELTIC LANGUAGES). In its earliest form it was spoken in Britain and closely resembled Cornish. As a result of social and political disturbances in Britain, many of the Celtic inhabitants emigrated during the fifth and sixth centuries to what is now French Brittany. The language that they planted there was known as Breton or Armorican. Besides certain linguistic peculiarities, such as the tendency to introduce parasitic nasals, Breton is distinguished from Welsh and Cornish by the large number of French words that it has naturalized from the time of Anne de Bretagne to the present day. The Celtic language was entirely driven out of Upper Brittany by French, but in Lower Brittany it is still spoken by more than a million people. In modern Breton four distinct dialects are recognized—those of Léon, Tréguier, Cornouailles, and Vannes. The Vannetais stands rather apart from the other three.

The material for the study of Old Breton consists entirely of glosses, containing some 500

different words, and lists of proper names, of which there is a considerable quantity in manuscripts ranging from the eighth to the tenth century. The oldest literary monuments that have been preserved are Middle Breton, from the fourteenth century on, and like those in Cornish they are almost entirely of a religious character. A number of the most important texts are accessible in recent editions.

During the nineteenth century there was a kind of literary revival in Brittany. In 1827 the Bible was translated into Breton by Le Gonidec. In 1839 appeared the first edition of *Barzaz Breiz*, by de Villemarqué, a book which gave rise to a long discussion resembling, on a smaller scale, the controversy over Macpherson's *Ossian*. The *Barzaz Breiz* was finally discredited as a reproduction of Breton popular songs, but it gave an impulse to the work of more scientific collecting which has gone on steadily to this day. The most valuable publications in this field have been those of M. F. M. Luzel.

At the present time in Brittany, as in the other Celtic countries, an active effort is being made to preserve the native language and to promote its use in literature.

Bibliography. For Old and Middle Breton monuments consult: Loth, *Chrestomathie Bretonne* (Paris, 1890); Ernault, *Le Mystère de Saints Barbe* (Paris, 1888); *Glossaire moyen-breton* (Paris, 1895-96). An important bibliography of modern Breton materials was contributed by Gaidoz and Sebillot to the *Revue Celtique*, vol. v (Paris, 1875); Henry, *Lexique étymologique du Breton moderne* (Rennes, 1900) is a very useful etymological dictionary. For history and criticism of Breton literature consult Le Goffic, *L'âme bretonne*, vols. i, ii (Paris, 1908-12). The current magazine *Les Annales de Bretagne* usually contains valuable contributions and bibliographies. Consult also Leclerc, *Grammaire bretonne* (Paris, 1908).

BRETSCHNEIDER, brät'shni-dër, HEINRICH GOTTFRIED VON (1739-1810). An Austrian author of somewhat eccentric habits. He was born at Gera and was educated first at the Institute of the Moravian Brothers at Elbersdorf and afterward at the gymnasium at Gera. He became captain of horse in a Prussian volunteer corps, in which service he was taken prisoner and was confined in a French fort until 1763. In 1775 he visited England, France, and Holland; in 1776 he entered the service of the Austrian government and in 1778 was nominated librarian of the University of Budapest, where through his eccentricities he came in conflict with the Jesuits. Emperor Joseph II undertook to protect him from their attacks. He was the author of many tales, poems, and satires, most of which appeared anonymously. The latter are attacks upon every kind of injustice and falsehood. In his *Almanach der Saints* (*Almanach der Heiligen*), for the year 1788, the priesthood is severely attacked, and the legends of the monks ridiculed.

BRETSCHNEIDER, KARL GOTTFRIED (1776-1848). A German Protestant theologian. He was born at Gersdorf, Saxony; studied at the University of Leipzig; was a lecturer on philosophy and theology at Wittenberg from 1804 to 1806; and in 1807 became pastor at Schneeberg. In 1816 he was appointed superintendent general and a member of the supreme consistorial court at Göttingen. He was a representative of the school of so-called rational supranaturalism, whose in-

termediate position is indicated by its name. His many and varied works display scholarly acuteness and literary skill, but lack speculative depth. His *Probabilia de Evangelii et Epistolarum Joannis Apostoli Indole et Origine* (1820) aroused considerable controversy. He is best known for the *Systematische Entwicklung aller in der Dogmatik vorkommenden Begriffe* (1805, 4th ed., 1841); and in particular for the *Lexicon Manuale Jacco-Latinum in Libros Novæ Testamenti* (2 vols., 1824, 3d ed., 1840). He established the *Corpus Reformatorum* (Halle, 1834 et seq.) and from 1832 was editor of the *Allgemeine Kirchenzeitung* of Darmstadt. A part of his autobiography (1851) is to be found translated in *Bibliotheca Sacra*, vols. ix and x.

BRETT, WILLIAM BALIOL. See ESHER, WILLIAM BALIOL BRETT, first Viscount.

BRET'TEN (in the eighth century, *Bredaheim*). A town of Baden, on the Saalbach, about 13 miles east of Karlsruhe, celebrated as the birthplace of Melancthon, the "Praeceptor Germaniae." It has manufactories of machinery and jannaped goods and carries on a trade in timber and cattle. Pop., 1900, 4800; 1910, 6025.

BRETTON, HENRY DE. A variant of BRAC-TON.

BRETT'S AND SCOTS, THE LAWS OF THE. The name given, in the thirteenth century, to a code of primitive law in use among the Celtic tribes in Scotland. The "Scots" were the Celtic people dwelling in the western and more mountainous districts north of the Forth and the Clyde, who, when it became necessary to distinguish them from the Teutonic inhabitants of the low country, received the names of "the wild Scots," and, more recently, "the Scotch Highlanders." The "Bretts" were the British or Welsh inhabitants of the region lying south of the Forth and Clyde. This province was for some centuries an independent kingdom, known by the names of "Cumbria," "Cumbria," and "Strathclyde." It became, about the middle of the tenth century, a tributary principality held of the King of the English by the heir apparent of the King of the Scots. It so continued till after the beginning of the twelfth century, when, Cumberland having been incorporated with England, the gradual absorption of the rest of the territory into the dominions of the King of the Scots seems to have been imperceptibly completed.

No more is heard of Cumbria as a principality, but "the Welsh" continue to be named among its inhabitants, in the charters of the Scotch kings, and they seem to have retained more or less of their ancient Celtic laws until after the beginning of the fourteenth century. It was not till the year 1305 that an ordinance of King Edward I of England, who appeared then to have reduced all Scotland to his subjection, decreed "that the usages of the Scots and the Bretts be abolished, and no more used." It is unknown how far this prohibition took effect. Of the code which it proscribed only a fragment has been preserved. The best citation is that preserved in the *Acts of the Parliaments of Scotland*, vol. i, pp. 299-301 (Edinburgh, 1844), where the laws are given in three languages—Latin, French, and English. The French version, which is the oldest, is printed from a manuscript of about 1270, now in the register house in Edinburgh. The fragment of the "laws of the Bretts and the Scots" thus published is

of much the same nature as the ancient laws of the Anglo-Saxons, the Welsh, the Irish, and other nations of western Europe. They are principally concerned with crimes of violence and contain elaborate provisions for determining the penalty of such crimes and the terms on which they might be commuted. They fix the *cro* or price at which every man was valued, according to his degree, from the king down to the churl, and which, if he were slain, was to be paid to his kindred by the homicide or his kindred. The *cro* of the king was 1000 cows, of the king's son or of an earl, 150 cows, of an earl's son or of a thane, 100 cows, of a thane's son, 66⅔ cows, of the nephew of a thane, or of an oghthein, 44 cows and 21⅓ pence, and of a villen or churl, 16 cows—all persons of lower birth than a thane's nephew, or an oghthein, being accounted villens or churls. A chapter "of blood-drawing"—corresponding with the *blodwyte* of the Anglo-Saxons—fixes the fine for a blow to the effusion of blood according to the degree of the person wounded and the place of the wound. See BLOOD FEUD, BLOOD MONEY, BREHON LAWS, WERGILD.

BREUGEL, bré'kel (BREUGHTEL) A family of Dutch painters. See BRUEGEL.

BREUL, biol, KARL IERMAN (1860—) A German-English scholar. He was born in Hanover. He studied from 1878 to 1883 at the universities of Tübingen, Strassburg, and Berlin, and in 1884 was appointed lecturer in German at the University of Cambridge. In 1885 he was also appointed lecturer in German at Girton and Newnham colleges. He was acting president and honorary vice president of the Modern Language Association in 1907, examiner to the universities of Oxford and Cambridge, to London University, and to the Royal University of Ireland, in 1897 became subeditor of the *Modern Quarterly of Languages and Literature*, and in 1910 was chosen professor of German in the University of Cambridge. He is among those who seek to introduce into England the educational methods of Germany. His publications include editions of (1889) Hauff's *Das Bild des Kaisers* (1890), Schiller's *Wilhelm Tell*, and (1899) Goethe's *Iphigenie a Handy Bibliographical Guide to the Study of the German Language and Literature* (1895), *Das höhere Schulwesen Grossbritanniens* (1897), *The Teaching of Modern Languages and the Training of Teachers* (3d ed., 1906). He also revised Heath's *German and English Dictionary* in 1906 and again in 1910, and prepared the bibliography for Goethe's *Poetry and Truth*, trans. by Muma Smith (London, 1913).

BREVE, brév (It *breve*, from Lat *brevis*, short). In general, a short writ, or royal mandate or summons. Specifically, in the practice of the Scottish law, since the institution of the Court of Session (1532), a writ issuing out of chancery in the name of the crown, to a judge, authorizing and directing him to try by jury the allegations of fact contained in the writ. Formerly these *breves*—corresponding to the *writs* and *pleas* of English legal procedure—were the foundation of almost all civil actions in Scotland, but with a simplified procedure they have gradually fallen into desuetude. They are retained, however, in a limited number of special proceedings, as in the appointment of a guardian to a minor or a lunatic, in the partition of an inheritance among several heirs, and in proceedings on the part of a widow

to recover her dower. See CHANCERY, PLEA, WRIT.

BREVE (It from Lat *brevis*, short). A note in music, found in early ecclesiastical notation, having the value of two whole notes or semibreves. In the measured strains of the old church music melodies moved slowly. About the eleventh century the two principal notes, in use were the *longa*, , and the *brevis*, , the first being twice or three times the length of the second, according to the measure used. So the *brevis*, or *breve*, the longest note possible in modern notation, was then considered a "short" note, as its name implies. At that time all notes were black, or "filled in." When, in the fifteenth century, white or "open" notes came into use, the *breve* was printed and still later . Either of these later forms is used in the rare instances when it is introduced into modern music. See MEASURABLE MUSIC.

BREVET (OF *brevet*, Fr *brevet*, dim of *bref*, from Lat *brevis*, short, the commission being a brief writing). A military commission endowing its recipient with a higher rank and title than he would otherwise be entitled to, or than that for which he draws pay. In French usage it applies to commissions in general. In England and the United States it has particular application to a special or higher commission, which is conferred as a mark of distinction, but which does not carry with it any increase in pay. In the United States such officers are addressed unofficially by their *brevet* rank, but in England such is the case only by courtesy, while officially both titles are used, as, for example, "Major and Brevet Lieutenant Colonel Smith." Originally the term designated a promotion given on such occasions as a coronation, or the termination of a great war, and had its origin during the reign of James II (1685-88), but it was abused so frequently and to such an extent by the general award of *brevet* commissions, that in 1854, during and after the Crimean War, its bestowal was limited strictly to cases of very distinguished service in the field and on the principle of seniority. A regimental officer holding a *brevet* rank takes the precedence due his rank only when in the field, for regimental purposes he ranks according to his regimental seniority. In the United States *brevet* titles were given during the Indian, Civil, and Spanish wars for "conspicuous gallantry," "gallant and meritorious service," etc, but they have only honorary significance. Officers who receive such commissions are recommended to the President, who nominates them and sends the commissions to the Senate for confirmation. *Brevet* commissions range in rank from first lieutenant to lieutenant general. In England *brevet* commissions are confined to grades not lower than the rank of captain or higher than lieutenant colonel.

BREVIARIUM OF EUTHYPIUS. See EUTHYPIUS.

BREVIARY (Lat *brevarium*, abridgment, abstract, from *brevis*, brief, short). The book, among Roman Catholics, which contains what is called the "divine office," or the service for the canonical hours. From very early Christian times the regular recitation of the Psalms of David formed a large part of the public and private devotion, it was developed in the West by the monks, whose life included frequent meeting for prayer, and still forms the ground-

work or nucleus of these offices. Around it grew up a whole system of hymns, prayers, antiphons (q.v.), responses, and readings from Holy Scripture, which forms a very varied and complicated service. Before the sixteenth century there was an infinite number of local uses, nearly every diocese having its own breviary. The most ancient and liturgically important of the non-Roman breviaries are the Mozarabic, once general throughout Spain, and the Ambrosian, traditional in Milan from the days of St. Ambrose. Pope Pius V abolished all that could not show an antiquity of 200 years; and at the present day the Roman breviary is almost universally used, with the exception of some slight calendar variations among the religious orders. It was systematized by Gregory VII (1073-85), received its practically final form under Pius V in 1568, with subsequent revision in detail by Clement VIII (1602) and Urban VIII (1634), and additions of new offices and feasts by all the later popes. The great number of new saints' days has rendered the ordinary ferial or week-day office very uncommon; and Leo XIII in 1883 permitted the substitution for it, on days when it would naturally occur, of a "votive" or voluntary office of a festival character, differing according to the days of the week. There is a tendency in favor of shortening the office, whose recitation, even in private, occupies at least an hour and a half every day. So complicated has the system become that a sort of annual almanac, called *Ordo Recitandi Divini Officii*, is published in many countries, containing minute directions as to what is to be read. The need of simplification led Cardinal Quignon or Quinones, a Spaniard, to publish a reformed breviary in 1535, which, while it was never widely used, gave the English reformers a number of hints for their simplified and condensed prayer book (q.v.).

The canonical hours are seven: matins and lauds (forming practically one service), prime, terce, sext, none, vespers, and compline. Matins was supposed to be, and is in monasteries, sung in the night; the other offices are called the day hours, and are published in separate form, for convenience, under the title *Horæ Diurnæ*. Lauds and vespers are the most important of these services, containing the "evangelical canticles" (the *Benedictus* at lauds and the *Magnificat* at vespers) and being sung with more ritual solemnity. The names prime, terce, sext, and none refer to the times at which they were originally recited—the first, third, sixth, and ninth hours of the day. Compline (*completorium*, the completion of the cycle) was recited at bedtime. Those who recite them privately, however, do so at any convenient time and frequently join two or more offices together. The daily recitation of the breviary is strictly obligatory on all clerics and all "choir" members of religious orders (as distinguished from lay brothers or sisters). The use of the breviary as a book of private devotion by laymen has become rare since the multiplication of devotional works of different kinds, but at present shows some tendency to increase; and it has always been a common custom to sing vespers or compline, at least on Sundays, in parochial churches.

The contents of the breviary, after the general rubrics, tables, calendar, etc., fall into five parts: 1. The Psalter, or original arrangement of the Psalms and prayers for the days of the week.

2. The Proper of the Season, containing the service for Christmas, Easter, Pentecost, and the seasons dependent on them. 3. The Proper of Saints, for the numerous special feasts which recur on a fixed anniversary. 4. The Common of Saints, parts of the service which belong to classes of saints, as apostles, martyrs, confessors, etc. 5. Several minor services, including the office of the dead and the little office of the Blessed Virgin Mary. The breviary forms a marvelous storehouse of powerful and tender religious thought; and as by far the largest part of its contents is in the language of Scripture, it is invested with much grandeur and vitality, while the lessons from the fathers and the lives of the saints read at matins contain a mass of scriptural, historical, and theological knowledge. Consult: *The Roman Breviary* (an Eng. trans. by the Marquis of Bute (London, 1879; rev. ed., New York, 1910); Batiffol, *History of the Roman Breviary* (London, 1912); Fleitner, *Altlate Geschichte des Breviergebetes* (Kempter, 1887); Bäumer, *Geschichte des Breviers* (Freiburg, 1895); S. Baumer, *Histoire du Breviaire* (Paris, 1905). For a modern edition of Quignon's breviary, consult Legg (Cambridge, 1888).

BREVIARY OF ALARIC (*Breviarium Alaricum*). An important collection of Roman laws, compiled by order of Alaric II, King of the Visigoths, in the first decade of the sixth century A.D. It corresponds historically to the code of laws promulgated by Theodoric, King of the Ostrogoths (*Edictum Theodorici*), the Salic Law (*Lex Saliica*) and Riparian Law (*Lex Ripuaria*) of the Franks, and other similar codes of that period. The primitive conception of law, as of personal and not territorial application, compelled the barbarian invaders to administer two systems of law—one for their barbarian followers, and the other for the Roman inhabitants of the territory occupied by them. The Breviary of Alaric II was a code designed for the Roman subjects of the invader and was almost exclusively Roman in character. It was made up of extensive abridgments of the Code and Novels of Theodosius, the Institutes of Gaius, and other recognized authorities. These texts were accompanied by an elaborate commentary, called the *Interpretatio*. A corresponding code promulgated by Alaric for his barbarian subjects, and containing their own native law, was known as the *Forum Judicium* and *Judicium Liber*. This was of the character of other primitive codes, as the Anglo-Saxon laws, the ancient Brehon law of Ireland, etc., though tintured, more than these, with the influence of Rome. The two codes together constitute the *Lex Visigothorum*. (See CIVIL LAW.) Consult Lee, *Historical Jurisprudence* (New York, 1900). See ALARIC II.

BREVIARY. See PRINTING.

BREVOORT, JAMES RENWICK (1832-). An American landscape painter. He was born in Westchester Co., N. Y., and studied architecture under Renwick in New York and painting under Thomas Cummings. In 1863 he was elected a member of the National Academy and in 1872-75 was its professor of perspective. He then lived for six years in Italy and sketched extensively in Germany, Holland, and England. He belonged to the older school of American landscapists, who have stood aloof from modern technical advances. He treats such subjects as "Lago Maggiore," "November Winds," "Scene in

Holland, near Arnheim, ' Castle of Heidelberg—Sunset," 'On the Gulf of Salerno," "A Swiss Scene, "Morning in Early Winter," 'Wild November Comes at Last"

BREWER A city in Penobscot Co, Me, on the Penobscot River, opposite Bangor, with which it is connected by a bridge, and on two branches of the Maine Central Railroad (Map Maine, D 4) It has lumber, paper, and pulp mills, a tannery, brickyards, and shipbuilding yards Brewer was set off from Orrington, incorporated in 1812, and was chartered as a city in 1889 The government is administered by a mayor, elected annually, and a city council Pop., 1900, 4835, 1910, 5667 Consult *History of Penobscot County* (Cleveland, 1882)

BREWER, DAVID JOSIAH (1837-1910) A distinguished American jurist, born at Smyrna, Asia Minor He graduated at Yale in 1856, at the Albany Law School in 1858, in 1861 and 1862 was a United States Commissioner, and in 1862-65 was judge of the probate and criminal courts of Leavenworth Co, Kans In 1865-69 he was judge of the District Court of the First Kansas District and from 1870 to 1884 was a justice of the State Supreme Court After having served as judge of the Circuit Court of the United States in 1884-89 he was appointed, in 1889, an associate justice of the United States Supreme Court He was also appointed a member of the Venezuelan Boundary Commission in 1896 While on the State bench he gave an opinion sustaining the Maxwell land grant, the largest private grant sustained in the United States, and a dissenting opinion on the question of the power of a municipality to issue bonds in assistance of railways During his 21 years of service on the bench of the Supreme Court he attained a position of commanding influence on public opinion as well as upon the development of the public and private law of the United States He was ranked as a scholarly jurist, and his public addresses attracted favorable attention His publications include *The Pew for the Pulpit* (1897), *American Citizenship* (1902), *The Mission of the United States in the Cause of Peace* (1909)

BREWER, EBENEZER COBHAM (1810-97). An English author and clergyman of the Established church, born in London He was educated at Cambridge and in 1836 was ordained priest He wrote many educational books, but was known chiefly for his various compendia and reference works, which include *A Guide to Scientific Knowledge* (1850), *A Guide to Scripture History* (1860), *A Guide to Every-Day Knowledge* (1864), *A Dictionary of Phrase and Fable* (1870, 25th ed, 1894), *The Reader's Handbook of Allusions, References, Plots, and Stories* (1880, 12th ed, 1888), *A Historic Note-Book* (1890)

BREWER, JOHN HYATT (1856-) An American organist and composer, born in Brooklyn, N Y He studied under Dudley Buck and in 1881 was appointed organist of the Lafayette Avenue Presbyterian Church From 1899 to 1906 he was professor of vocal music in Adelphi College, and in 1903 he was elected leader of the Apollo Club, of Brooklyn, N Y His compositions include church music, and secular works for voice, organ, piano, and orchestra.

BREWER, JOHN STIERSEN (1810-79). An English historical writer, born in Norwich He was educated at Queen's College, Oxford, took deacon's orders in 1837, and in 1839 was ap-

pointed lecturer in classical literature at King's College, London In 1855 he was appointed professor of the English language and literature and lecturer in modern history For some time he was editor of the *Standard*, but in 1856 began for the Master of the Rolls a series of investigations for the preparation of various works, of which the *Calendar of Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII* (incomplete, vols 1-v, 1862-72) must be reckoned the most important His further works in this connection include editions of the *Monumenta Franciscana* (1858) and (1859) of the *Opus Tertius and Opus Minus* of Roger Bacon His *English Studies*, republished from the *Quarterly Review*, were edited by Dr Wace in 1881

BREWER, THOMAS MAYO (1814-80) An American ornithologist, born in Boston, Mass, Nov 21, 1814, and died there Jan 23, 1880 He was a physician, newspaper editor, and publisher In 1839 he edited a new edition of Wilson's *Ornithology* He wrote most of the biographical sketches in the *History of North American Birds*, by Baird, Brewer, and Ridgway (1874-84)

BREWER, WILLIAM HENRY (1828-1910) An American agriculturist, born in Poughkeepsie, N Y He graduated at Yale (now Sheffield) Scientific School, 1850, and was appointed professor of agriculture there in 1864 He was closely and influentially identified with the movement for agricultural education and research in the United States for more than half a century With Claenae King, he surveyed large tracts of the Sierras, one of the highest peaks in those mountains being named in his honor In 1904 he was one of the party on the trip of the *Muanda* into Arctic regions, and in 1906 was a member of the United States Forestry Commission He contributed to the *Report on Cereal Production in the United States* tenth census (1883), and wrote *Botany of California* (1875)

BREWERS' GRAINS The residue resulting in the manufacture of beer from grain, usually barley, much used as a feed for live stock In beer making the grain is treated with malt to change the starch into sugar, which is then fermented, yielding alcohol The residue of the grain, which constitutes the brewers' grains, is very wet, containing some 75 per cent of water It is sometimes sold in this wet condition, for immediate use in the vicinity of the brewery, but spoils rapidly On account of this and the putrid odor it causes in stables, its use for milch cows is often objected to There is nothing in itself, wet brewers' grains which is poisonous or deleterious to milk production, provided they are fed in tight mangers which are kept clean The partially spoiled grains should not be used for feeding Brewers' grains are often dried by artificial heat, freeing them very largely of their water, in which condition they keep indefinitely The average composition of the dried grains is as follows water 7.8, ash 3.5, protein 22.6, fibre 12.3, nitrogen-free extract 46.8, and fat 6.5 per cent They are an excellent feeding stuff, especially for cattle and horses, ranking with wheat bran and oil meals in palatability and general effects

BREWERTON, HENRY (1801-79) An American soldier, born in New York City He graduated in 1819 at the United States Military Academy, was commissioned in the corps of

engineers, and rose in that service to the rank of colonel (1864) and brevet brigadier general (1865). From 1845 to 1852 he was superintendent of the United States Military Academy, from 1861 to 1864 directed the improvements in Baltimore harbor and at the mouth of the Susquehanna River, and during the Civil War was superintending engineer of the fortifications of Baltimore harbor and the defenses of Delaware Bay and River. He was among those who contributed to the early extension of the system of coast and frontier defenses.

BREWING (AS. *brēwan*, OHG. *brīuan*, Ger. *brauen*, Icel. *brugga*, to brew; cf. Gk. *spīron*, *bryton*, a kind of beer or cider). The process of making beer, ale, or other fermented beverages which do not undergo distillation. This art, which is one of the oldest (see BEER), has been improved from time to time so that at the present day, by the aid of chemistry and bacteriology, the manufacture of beer involves a high degree of technical skill. While it is usual to speak of the manufacture of beer as brewing and the place where it is made as a brewery, yet, to be more exact, there are two distinct and separate processes to be considered, the malting and brewing proper.

The raw materials for making beer are water, barley, and hops. The first process in the manufacture is the malting of the barley.

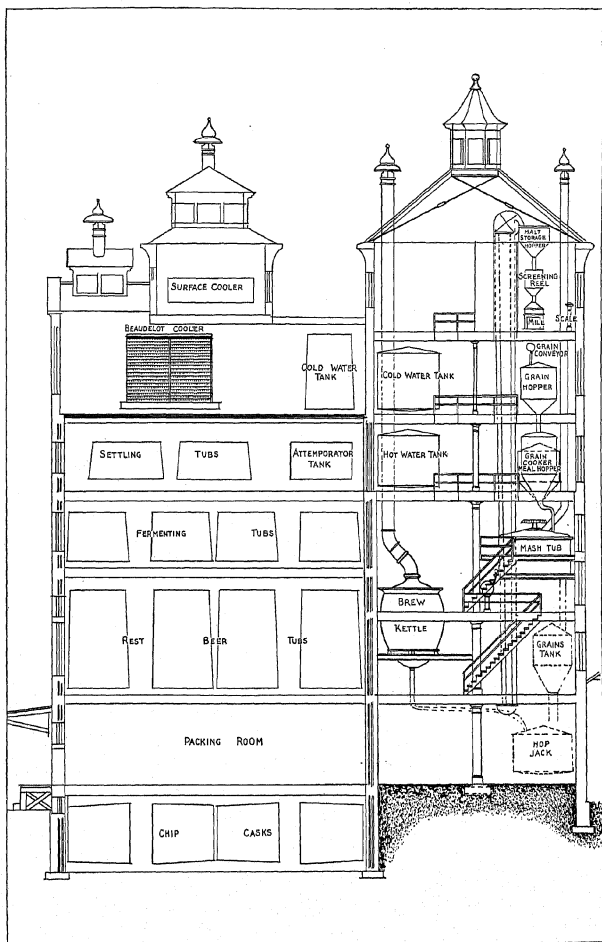
Malting. The grain is first steeped by placing it in wooden, cement, or metal cisterns and covering it with cold water. This process of steeping lasts from 45 to 72 hours, the water being drained off about once a day and replaced by fresh water. During the process of steeping the barley absorbs a portion of the water, which causes it to swell and soften. After being finally drained, the barley is taken from the steeping tanks and spread to a depth of one foot on the malt-house germinating floor. This part of the process is known as "couching." In this position the grain begins to germinate or grow sprouts, which, if allowed to develop, would form the future rootlets and blades of the barley. This process is one which the maltster watches with the utmost care, since upon its being properly accomplished depends much of the final success of the brew. The chief requisites to be observed are that the germination shall be slow and regular, that it shall not proceed at too high a temperature, and that it shall be checked at the proper time. Different varieties of barley germinate with different speeds, and the maltster has to study the peculiarities of each variety and regulate his work accordingly. This regulation is accomplished by thinning out the couches; by regularly turning the grain over and respreading it; by letting in or shutting out the warmer or the colder outside air, and by resprinkling the grain with water. The thinning down of the couches is technically known as "flooring." The duration of the process of germination varies, but it usually is over six days. The next step is to check the germination, and this is done by kiln drying. The kiln consists of a building with two or three perforated floors. The upper floors are usually provided with dumping devices for the purpose of allowing an easy transfer of the grain to the floor below. The kiln house is supplied with furnaces whose purpose it is to furnish heat, and in which anthracite pea coal or coke is burned. In drying, the grain, or green malt as it is called, is spread on the upper floor and when

much of the water has been expelled it is dumped to the floor below where the temperature is higher. The final drying temperature for pale malt, used for making beer of the Pilsen type, is around 145° F., and in the neighborhood of 220° F. for dark malt, used for Munich type beers. In addition to checking germination, kilning produces certain substances which impart an aromatic flavor to the beer.

Brewing. The first operation in brewing is to crush, or technically to "bruse," the malted grain by passing it between iron rollers, the ground product from which is termed "grist." The grist is then mixed mechanically with warm water until it has about the consistency of ordinary porridge in the mash tubs, where the temperature is raised to about 165° F. within a certain period of time. Modern mash tubs are provided with mechanical mixers for agitating the mixed grist and water which is now called the "mash." If raw grain is to be used, it is introduced at this stage. Before adding it to the mash, however, it must undergo a process of preliminary solution. This is accomplished by boiling the grain for a time (in water) in ordinary or pressure tanks, called cookers, then cooling the mixture down to about 160° F. and adding some malted barley. After standing for one-quarter of an hour or so the temperature is raised to about 190° F., and the partly soluble raw-grain mash is run into the mash tub containing the all-malt mash. Here saccharification takes place. If prepared cereals, such as corn flakes, are used, the preliminary dissolution treatment is unnecessary, because these materials are worked up with the malt in one mash tub. After standing in the mash tub from 30 to 45 minutes, the liquor is drained off from the bottom, hot water being slowly and evenly run over the top of the residus thoroughly to wash or purge the grist from the liquor, which is now called "wort." The wort is allowed to stand for a brief time to clarify and is then drawn off into copper boilers, where it is boiled with hops. From one to three bushels of malt and from one to three pounds of hops are used for a 31-gallon (U. S.) barrel of all-malt beer. After being boiled down to the proper concentration in the copper kettles, the wort is drawn off and cooled quickly by passing it through or over pipes (Baudelot cooler) in which cold water and ammonia circulate (different pipes). In the older types of breweries the surface cooler (cool ship) is still used. This consists of a large shallow vessel which allows a large surface of wort to be exposed to the air at one time; this causes rapid cooling. From the cooler the wort is run into the vats where fermentation takes place. (See FERMENTATION.) Fermentation is started by adding about five pounds of good yeast to 100 gallons of wort, the yeast used always being some which has been reserved from a previous brewing of the same kind of beer. Fermentation is allowed to progress for a number of days, and the time depends very much upon the kind of beer brewed. Top fermentation beers require but a few days, while bottom fermentation beers need 8 to 16 days. It is comparatively slow at first and then rapidly increases as the wort begins to "work" and the temperature has risen considerably; large quantities of carbonic-acid gas are thrown off, and the surface of the wort is covered with a thick layer of scum. The next process is to run the fermented liquor into other vats, known as

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BREWING



CROSS SECTION OF A MODERN BREWERY

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cleansing or settling vats, which, like some fermentation vats, are usually provided with some means for cooling their contents, where a mild secondary fermentation occurs, which throws off the remnants of the yeast in the shape of scum. The beer is then drawn off into casks, where it is stored, for a greater or less length of time and under different conditions of temperature, to mature. The time required and conditions provided for maturing several of the more common varieties of beer are different in their precise natures and are discussed under BEER. Before marketing many of the beers are fined, chilled, filtered, charged with carbonic-acid gas and pasteurized. This increases the keeping qualities and improves the appearance.

Technology and Chemistry. The two preceding paragraphs outline briefly the processes of malting and brewing. Briefly enumerated, the technical considerations which call for the most particular attention are (1) the nature and quality of the grain used, (2) the malting of the grain, (3) the temperature at the commencement of mashing and again at the beginning of fermentation, and (4) the quality of the water used. Regarding the choice of barleys for brewing, they should be thoroughly ripened and should be carefully harvested and handled to preserve the skin or husk of the kernel, since when the kernel is bruised or has its skin broken, mold, bacteria, and wild yeasts are likely to attack it and cause trouble, if not disaster, in malting and brewing. Regarding the incipient temperature of the mash and of the wort at the commencement of fermentation, it can only be said here that it is held to be of prime importance, and if not accurately controlled may result in spoiling the brew. In respect to the water used, the principal requirements are that it should be absolutely pure and should be somewhat "hard," i.e., it should contain lime salts, especially in the form of gypsum. The principal chemical actions occur during malting, when the mash is being made, and during fermentation. During the malting or sprouting of the grain substances known as enzymes are produced. One of these is known as diastase or amylase and has the property of changing starch into dextrin and maltose. This process is known technically as saccharification and is one of the most important which enter in the brewing of beer. Another enzyme formed in barley during the malting process is peptase, it has the property of converting the insoluble proteins into peptones and other substances soluble in water.

During fermentation the sugars (maltose, etc.) and some of the dextrins are decomposed by the enzymes (maltase, zymase, etc.) contained in yeast, into alcohol and carbonic-acid gas. It has been found by experiment, and verified in practice, that 100 parts of sugar when fermented will yield about 50 parts of alcohol and 47 parts of carbonic-acid gas. Other products formed are succinic acid, glycerine, etc.

The amount of alcohol in beer is controlled almost entirely by the temperatures employed in making the wort. High temperatures tend to yield beers with a low alcohol percentage, and this fact is taken advantage of in the preparation of the so-called temperance beers. See ADULTERATION.

Consult R. Wahl and M. Hemus, *American Handy-Book of the Brewing, Malting and Auxiliary Trades* (Chicago, 1908), W. J. Sykes, *Principles and Practice of Brewing* (London,

1907), A. Klocke, *Fermentation Organisms* (London and New York, 1903), E. C. Hansen, *Practical Studies in Fermentation* (London and New York, 1896), P. Dreesbach, *Beer Bottlers' Handy-Book* (Chicago, 1906), A. J. Brown, *Laboratory Studies for Brewing Students* (London, 1904), Arnold, *Origin and History of Beer and Brewing* (Chicago, 1911), Zimmerman, *Die Bierbrauerei der Neuzeit Praktisches Handbuch fur das Braugewerbe* (Baitenstein, 1913).

BREWSTER, BENJAMIN HARRIS (1816-88). A notable American lawyer. He was born in New Jersey, graduated at Princeton in 1834, and was admitted to the bar of Philadelphia in 1838. In 1846 he was one of the commissioners who decided the claims of the Cherokee Indians against the United States. He was appointed Attorney-General of Pennsylvania in 1867, and during his term of office succeeded in breaking up the notorious "Gettysburg Lottery" scheme. From 1881 to 1885 he was Attorney-General of the United States, in President Arthur's cabinet, and in this capacity conducted the "Star Route" trials with great energy and ability.

BREWSTER, CHAUNCEY BUNCE (1848-) An American Protestant Episcopal bishop. He was born at Windham, Conn., and was educated at Yale University. After occupying rectories at Rye, N. Y. (1873-81), Detroit (1881-85), Baltimore (1885-88), and Brooklyn (1888-97), he was in 1899 elected Bishop of Connecticut. The following are his principal publications: *The Key of Life*, a series of Good Friday addresses (1894), *Aspects of Revelation* (1901), *The Catholic Ideal of the Church* (1905), *The Kingdom of God and American Life* (1912).

BREWSTER, SIR DAVID (1781-1868). An eminent Scotch physicist, born at Jedburgh. He was educated for the Church of Scotland at the University of Edinburgh and was licensed to preach by the presbytery of Edinburgh. Instead of following the life of a clergyman, he devoted himself to scientific study and research and literature, and in 1808 he became the editor of the *Edinburgh Encyclopædia*, to which he contributed many important scientific articles. Previous to this he had entered deeply on the study of optics, with which his name is now enduringly associated. The optical toy called the kaleidoscope was invented by him in 1816, and he published a treatise on the instrument three years later. The stereoscope is also largely his invention, the honor being shared with Wheatstone, though the divided lenses and their arrangement are due entirely to Brewster. In 1817, in conjunction with Professor Jameson, he edited the *Edinburgh Philosophical Journal*, the name of which, in 1819, was changed to the *Edinburgh Journal of Science*, and in 1831 he was one of the founders of the British Association for the Advancement of Science. Brewster's scientific work brought to him many honors. In 1815 he obtained the Copley medal of the Royal Society for one of his optical discoveries and soon after was elected a fellow. In 1816 he received half of the physical prize bestowed by the French Institute for two of the most important scientific discoveries made in Europe during the two preceding years. In 1819 the Royal Society awarded him the Rumford gold and silver medals for his discovery connected with the polarization of light. In 1825 he became corresponding member of the Institute of France. In 1831 he was knighted and had a

pension conferred upon him. In 1838 he was chosen principal of the united colleges of St. Leonard and St. Salvador, St. Andrews. In 1849, on the death of Berzelius in the preceding year, he was elected one of the eight foreign associates of the French Institute, the highest scientific distinction in Europe. Brewster was also a member of the Imperial and Royal Academies of St. Petersburg, Berlin, Copenhagen, and Stockholm, and a foreign associate of the National Academy of Sciences of the United States. He presided over the British Association and in 1851 over the Peace Congress held in London. In 1859 he was chosen vice chancellor of the University of Edinburgh. His principal work is his *Life of Newton*, first published in 1828 and issued in a totally new and greatly enlarged form in 1855. Among his other works are his interesting *Letters on Natural Magic*, addressed to Sir Walter Scott; *More Worlds than One* (1854); his treatises on the kaleidoscope and on optics (*Cabinet Cyclopædia*); his *Martyrs of Science*; and his treatises in the *Encyclopædia Britannica* on electricity, magnetism, optics, the stereoscope, etc. Among the periodicals to which he contributed largely are the *Edinburgh and North British reviews*. Consult Gordon, *Home Life of Brewster* (Edinburgh, 1869).

BREWSTER, FREDERICK CARROLL (1825-98). An American lawyer, born in Philadelphia, Pa. He graduated at the University of Pennsylvania, was admitted to the bar in 1844, and from 1862 to 1866 was city solicitor of Philadelphia. In the latter year he became judge of the Court of Common Pleas, and in 1869 Attorney-General of Pennsylvania. He was instrumental in obtaining for the city of Philadelphia the Stephen Girard bequest and the Schuylkill River Bridge. His publications include a *Digest of Pennsylvania Cases* (1869); *Brewster's Reports* (4 vols., 1869-73); *Practice in Pennsylvania Courts* (1888).

BREWSTER, WILLIAM (c1560-1644). A leader of the "Pilgrims," generally known as Elder Brewster, who came to America in the *Mayflower* in 1620. He was born at Scrooby, Nottinghamshire, studied for a time at Cambridge, and from 1584 to 1587 was in the service of William Davison, then Ambassador to the Low Countries (and afterward the Assistant Secretary of State of Queen Elizabeth), who, says Bradford, regarded him as "so discreet and faithful that he trusted him above all others who were with him." About 1587 Brewster retired to Scrooby, "to live in the country in good esteem amongst his friends and the good gentlemen of those parts, especially the godly and religious." Here he occupied the old Scrooby manor house, and for some years held the position of "post," which was then frequently filled by men of high social standing, and which involved the entertainment of travelers, as well as the dispatch of the mails and the supplying of relays of horses. He was in thorough sympathy with the Separatists at Scrooby, who on each Sunday assembled for worship at the manor house. In 1608 he was one of the company of Nonconformists who, to avoid persecution, removed to Holland; and at Leyden, his fortune having been exhausted, he supported himself by teaching English to the students at the university, and by publishing books whose circulation was prohibited by the English government. With Bradford, Carver, and Winslow, he urged the migration to America, and with

Bradford he went to England in 1619 and secured a patent from the Virginia Company for a tract of land in America. In the following year he crossed the Atlantic, with the first company of "Pilgrims," and for the next 24 years was one of the leaders at Plymouth, where he did much by his energy and cheerful optimism to make the colonizing experiment a success. Having been the ruling elder of the congregation in Scrooby, Amsterdam, and Leyden, he continued to act as such at Plymouth, and until 1620 was also a teacher and preacher, holding services twice each Lord's Day, though he always refused to administer the sacrament. At his death he left a library of more than 300 volumes, a catalogue of which has been preserved. Bradford prepared an interesting *Memoir of Elder Brewster*, which may be found in Young's *Chronicles of the Pilgrims* (Boston, 1841), and in vol. iii, 5th series, of the *Collections of the Massachusetts Historical Society*. Consult Steele, *Chief of the Pilgrims; or the Life and Times of William Brewster* (Philadelphia, 1857).

BREWSTER, WILLIAM (1851-). An American ornithologist, born at Wakefield, Mass. He graduated from the Cambridge High School. From 1880 to 1887 he had charge of the collection of birds and mammals of the Boston Society of Natural History, from 1885 to 1900 he was in charge of the department of mammals and birds, and after the latter year of birds alone, at the Cambridge Museum of Comparative Zoölogy. He devoted most of his time to managing his private museum of ornithology. His publications include: *Bird Migration* (1886); *The Birds of the Cape Region of Lower California* (1902); *The Birds of the Cambridge Region of Massachusetts* (1906).

BREWSTER'S LAW. See LIGHT, Polarization.

BREWTON, brū'tŭn. A city and the county seat of Escambia Co., Ala., 105 miles south by west of the State capital, Montgomery, on the Louisville and Nashville Railroad (Map: Alabama, B 4). The city contains an industrial school for girls and the Brewton Collegiate Institute. It has truck-farming interests and various manufactures of wooden products. Pop., 1900, 1882; 1910, 2185.

BREYMANN, brīm'ān, HERMANN (1843-1910). A German philologist. He was born at Oker, near Harzburg, and studied philology at the universities of Göttingen, Bonn, Marburg, and Paris. From 1867 to 1875 he lived in Manchester and London. In 1875 he was appointed professor of French and English at the University of Munich. He was one of the foremost authorities on pedagogical questions affecting instruction in modern languages. In addition to the *Münchener Beiträge zur romanischen und englischen Philologie*, of which he was the editor (1890 ff.), Breymann published the following important works: *Les deux livres des Machabées* (1868); *Marlowe's Dr. Faustus* (1889); *Bearing of the Study of Modern Languages on Education at Large* (1872); *Die, sein Leben, seine Werke* (1878); *On Provençal Literature* (1875); *Die neusprachliche Reform-Literatur 1876-93* (1895); *1894-99* (1900); *Calderon Studien* (1905); *Die phonetische Literatur von 1876-95* (Leipzig, 1897).

BRIALMONT, bré'al'mŏn', HENRI ALEXIS (1821-1903). A Belgian engineer and military writer. He published a large number of works

on the art and methods of military fortification and is regarded as an authority on this subject. He designed the principal fortifications of Antwerp, the fortifications of Bucharest (1883), and those of Liège and Namur, in 1887. Among his publications are *Precis d'art militaire* (4 vols, 1850), *La fortification du temps présent* (2 vols, 1885), *Progres de la défense des états et de la fortification permanente depuis Tanbon* (1898).

BRI'AN BOROMHEE, bo-rom', or BORU, bo-rōw' (926-1014). A famous King of Ireland. He became King of Cashel, comprising the present counties of Tipperary and Clare, in 978. In 1001, after defeating Maelsechlainn, he was acknowledged the chief King of Ireland. The surname Boromhe, signifying 'tax,' was given him in consequence of the tribute in kind he levied from the various provinces. He lived in the Dun of Cenn Coradh, in a state of rude plenty. He is said to have defeated the Danes in 25 pitched battles. In the battle of Clontarf, April 23, 1014, in which he was killed, Brian gained a signal victory over a united army of revolted natives and Danes, the power of the latter receiving a shock from which it never recovered. Brian Boru is the great hero of the Irish, but fact and fiction have become so mingled in the accounts of his life that it is difficult to form an accurate picture of the real warrior chieftain.

BRIANCHON, bi'ān'shōn', CHARLES JULIEN (1785-1864). A French mathematician, born in Sévres. He studied at the Ecole Polytechnique, in 1808 was appointed lieutenant of artillery, in 1815 assistant director of the manufacture of arms, and in 1818 a professor at the Ecole d'Artillerie. His publications include *Application de la théorie des transversales* (1818) and *Essai chimique sur les réactions foudroyantes* (1825). He is best known for a theorem which appeared in 1808 in the *Journal de l'Ecole Polytechnique*, in an article later expanded into *Mémoires sur les lignes du second ordre* (1817). One form of the statement of the theorem is: The three diagonals of every hexagon circumscribed to a conic meet in a point. See GEOMETRY.

BRIANÇON, bi'ān'sōn' (anciently, Lat *Brigantium*, the town on the heights, from Celt *bragh*, *brig*, heap, pile, elevation). A strongly fortified town in the department of the Hautes-Alpes, France, situated at the confluence of the Durance and Guisane, about 35 miles northeast of Gap (Map France, S, L 4). It is the highest town in France, being more than 4300 feet above sea level. It is a fortress of the first class, commands the entrance into Italy by Mont Genevre and the principal passes, and is the principal military depot and arsenal in the French Alps. Briançon has manufactures of silk, cotton, hosiery, and cutlery. Pop., 1901, 7426, 1911, 7888. In Roman times the town was called Brigantium and lay on the direct route from Italy to Embrun and Gap. It was not fortified by the French until 1722, and the building of its 10 forts has gone on from that date until today.

BRIAND, bi'ānd', ARISTIDE (1803-) A French statesman born at Nantes. Although he was trained as a lawyer, M. Briand's interests have always been in the fields of journalism and politics. For several years he was a contributor to Radical and Socialist journals like *La Lanterne*, *Petite République*, and *L'Humanité*. He entered politics as an advanced Radical—ad-

vanced even to the point of Socialism—and made himself conspicuous by advocating the general strike. In 1902 he was elected to the Chamber of Deputies as a Socialist Radical. M. Briand soon attracted attention in Parliament by his brilliant exposition of difficult and involved subjects. His talents won him the position of reporter or chairman of the committee to draft the bill separating church and state. The report of this committee, drawn up mainly by M. Briand himself, is a masterpiece of historic study, keen analysis, and constructive suggestion, and became the basis for the law of separation. In 1906 he became Minister of Public Instruction and Worship in the Sarrien cabinet and applied the law with great sagacity and tact, for although an anticlerical, M. Briand is not an extremist, and for that reason he won the hearty support of all moderate people in France.

In 1909 M. Briand became Prime Minister. As he advanced in power, his views became more and more conservative, and he was expelled from the Socialist party. The great event of his ministry was the railroad strike of 1910. The General Confederation of Labor, a revolutionary Syndicalist organization, called a general strike on all French railroads, and over 30,000 men responded. France was completely at the mercy of the strikers, and acts of violence or *sabotage* became frequent. Prime Minister Briand, seeing the revolutionary character of the movement, decided upon an unusual but effective course. The strikers were "called to the colors" as reserves for three weeks' military training. They were assigned to protect the railroads. In other words, they became their own strike breakers. This move succeeded, and the strike immediately collapsed, although it earned for M. Briand the hatred of the French working class, who bitterly denounced him as a renegade and a dictator. His defense was that the government was confronted by what was virtually rebellion, that society had the right to use all means, even illegal ones, for its own safety on the ground of *salus publica suprema lex*. On Feb. 27, 1911, the Briand Ministry fell because it was charged with having shown remissness in enforcing the church laws. Briand again became Prime Minister in 1913, but his tenure of office was very short. The bill establishing proportional representation supported by the cabinet passed the Chamber, but was defeated in the Senate. M. Briand then resigned. Soon thereafter Briand and Louis Barthou, also a former Premier, together with many Republican Senators and Deputies, formed a new political organization, the "Briandist party," which should labor for the welfare of France as a whole, not for the satisfaction of local constituencies.

BRIANSKY, biyānsk, or **BRYANSKY** (RUSS., earlier *Debnyansk*, Slav *Dibryansk*, from *dobry*, thick, forest, for which the neighborhood was quite famous). A district town in the government of Orel, Russia, on the right bank of the navigable Desna, about 80 miles northwest of Orel (Map Russia, D 4). It is divided into several parts by a number of short streams and contains a large number of churches, among which the Pokrov Cathedral is the most prominent. In the vicinity of the town is situated the monastery of Svensk-Uspensk, dating from the thirteenth century and containing a theological seminary. The settlement around the monastery is the place of an important annual fair.

Briansk has a considerable trade in hemp, leather, tumber, ropes, grain, and salt. The chief manufacturing establishments are iron foundries, tanneries, and glass works. There is also an important arsenal. Pop., 1888, 20,200; 1897, 23,520.

BRIAREUS, bri-ä-ré-üs (Gk. *Briareus*, *Briareüs*), or *Ægeon*. One of the three sons of Uranus and Gæa. Homer (*Iliad*, i. 403) declares that men called him *Ægeon*, the gods Briareus. The other sons were Cottus and Gyges, or Gyges, and each of the three had 100 arms and 50 heads. They assisted Zeus when the Titans made war against Olympus; they were set by Zeus to guard the defeated Titans in Tartarus. In Homer Briareus appears alone as a friend of Thetis, and ally of Zeus during a revolt of the gods. In some accounts he is represented as dwelling in the depths of the *Ægean Sea*.

BRIBERY, bri-br'ë-r-i (OF. *brüberie*, from OF. *bride*, bit of bread given to a beggar, from Breton *brad*, to break). The offering, promising, giving, or receiving of money, goods, employment, or personal advantage of any kind with a view to unlawfully influence the receiver in the exercise of a public duty. Such public duties are those of judges, legislators, executive officers of government or state, voters in the exercise of suffrage, customs officers, and others. The person giving, as well as the one receiving, the bribe is guilty of the crime of bribery. The United States and the several States in their statutes define the offense and impose severe penalties of fine or imprisonment, or both, for conviction of bribery.

Judicial bribery is defined by Greenleaf as the "receiving or offering any undue reward by or to any person whose ordinary profession or business relates to the administration of public justice, in order to influence his behavior in office and incline him to act contrary to the rules of honesty and integrity." It is a matter of congratulation that the higher courts of the United States have been almost uniformly free from the taint of suspicion of bribery. The United States Supreme Court has a spotless record in this respect, as have most of the higher courts of the several States. The offense has been rare, also, in the history of the administration of justice in England. It was punishable at common law. Perhaps the earliest reported case of judicial bribery is that of Sir William Thorpe in 1351. This was followed by the impeachment of Chancellor Michael de la Pole in 1384. But the most celebrated case of judicial bribery in England is that of Lord Bacon, who pleaded guilty to corruption in office, and who was sentenced to pay a fine of £40,000 and to imprisonment during the King's pleasure, incapacity for office, and exclusion from Parliament.

The corruption of other public officials was also a common-law offense, whether the bribery was employed to induce the officer to act or to refrain from acting in his official capacity. The mere offer of a bribe, though it was refused, constituted a common-law misdemeanor. The bribery of jurors is considered under *EMBRACERY*.

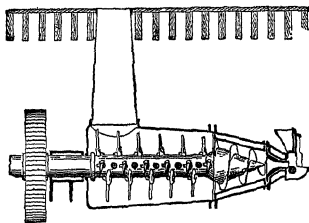
The form of bribery which is most dangerous at present, as well as the one which has called forth the greatest amount of legislation, is that which aims at the corruption of voters at public elections. Modern statutes upon this subject are dealt with under *ELECTORAL REFORM* and *CORRUPT PRACTICES*. An announcement by a candidate for office that, if elected, he will serve

at a less salary than that provided by law has been held to be an offer of a bribe to the voters. (See *ELECTION*; *ELECTORAL REFORM*; *CORRUPT PRACTICES*; *CRIMINAL LAW*.) In England and several of the United States the bribery of representatives of labor organizations, as well as of a private agent, employee, or servant, has been made a criminal offense.

BRIC-A-BRAC (Fr. possibly from OF. *de bris et de broc*, by hook or by crook, or it may be a reduplication with a change of vowel, like *rick-rack*, *niff-raff*, etc.). A word of uncertain origin denoting objects of many kinds used for decorative purposes, such as old furniture, *objets de vertu*, or ornaments, interesting because of rarity, or merely because they are quaint or obsolete. The term usually designates small objects and differs from *curio* in that its connotation extends only to articles that have some claim to æsthetic merit. Bric-a-brac is often of archaeological and even of ethnological interest, but the taste sometimes degenerates into a "fad" and often results in overloading spaces in dwellings. When systematic or historic collections are made on a large scale, they may be extremely useful as preserving for future generations the minor notes of many of the fast-vanishing modes of life, manners, and practices of the past revived through their study.

BRICE, CALVIN STEWART (1845-98). An American lawyer and politician. He was born in Ohio and served in the Union army from 1862 to 1865. He graduated at Miami University in 1863, practiced law for a short time, but soon turned his attention to railroad affairs, and was identified with the East Tennessee, the Richmond Terminal, the Duluth, South Shore, and Atlantic, and several other roads. At the time of his death he was interested in the American China Development Company. After having served as chairman of the Democratic National Campaign Committee in 1889, he was a member of the United States Senate from 1890 to 1897.

BRICK (probably allied to *break*, originally meaning a fragment; cf. Fr. *brigue*, a piece, fragment). The earliest examples of this branch of the ceramic art were doubtless the sun-dried bricks of Egypt, Assyria, and Babylonia. In America bricks were made in Virginia as early as 1611; in Massachusetts in 1620, and in Phila-

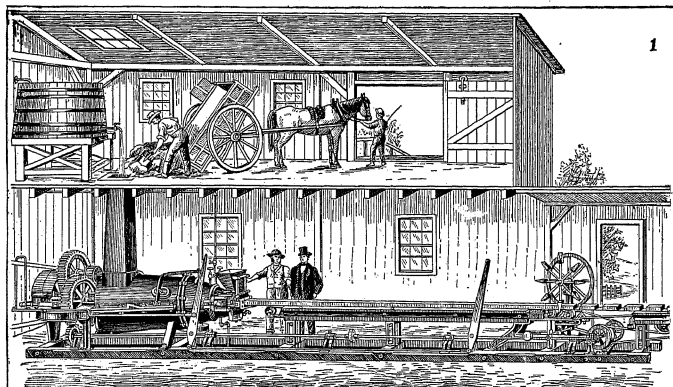


TEMPERING DEVICE AND AUGER OF BRICK MACHINE.

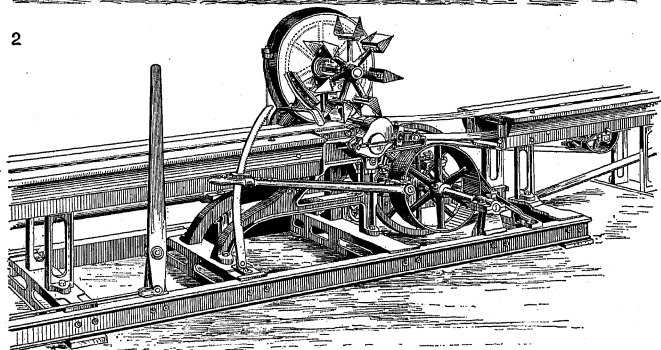
delphia in 1633. All bricks used prior to that date were probably imported. The hand-power brick machines were patented as early as 1800, and a steam-power press was invented by Adams of Philadelphia not later than 1840.

Raw Materials Used. *Common bricks* are

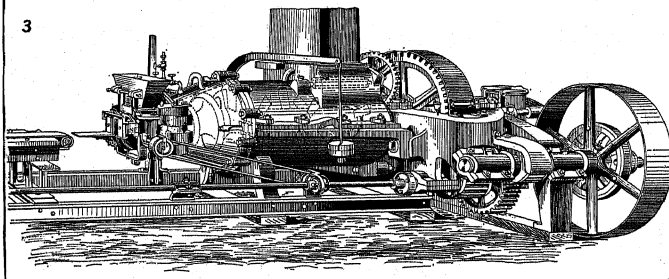
BRICK-MAKING MACHINERY



2



3

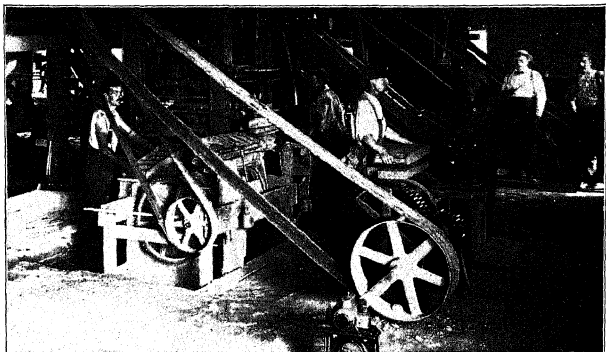


1. END-CUT BRICK MACHINE IN OPERATION.

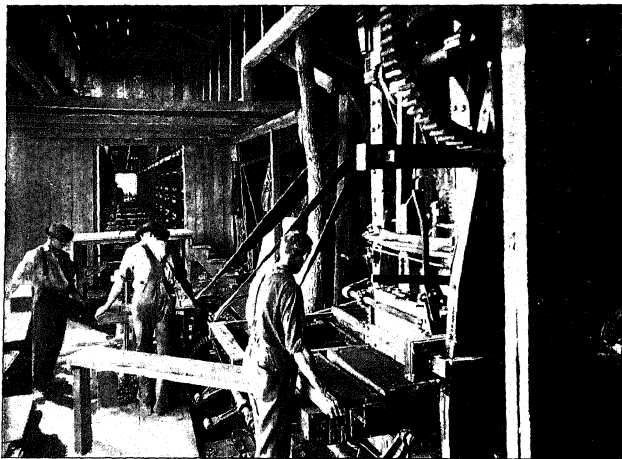
2. AUTOMATIC WIRE CUTTER FOR END-CUT BRICKS.

3. LARGE AUGER MACHINE.

BRICK-MAKING MACHINERY

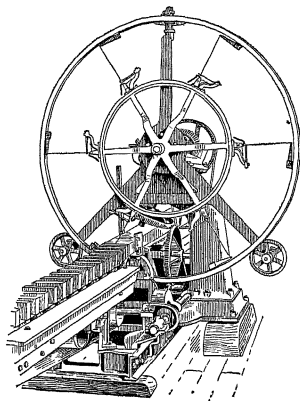


The laborer on the left is putting empty molds into the sanding machine preparatory to placing in molding machine. The workman on the right is dumping bricks from mold onto pallet.



This plate shows filled molds coming from the machine and second laborer dumping bricks from mold onto pallet, which is transported by carrying belts to drying racks.

made from clays or shales, usually of low grade, and mostly of red-burning character, although in some districts cream-burning ones only are available. They are required to mold readily and burn hard at a moderate temperature. *Face*



SIDE-CUTTING MACHINE

brick are made from red-burning clays or shales, buff-burning clays of either refractory or calcareous character, or more rarely white-burning clays. The materials are usually exposed to higher temperatures in burning than the common-brick clays. *Fire brick* are manufactured from a clay of refractory character.

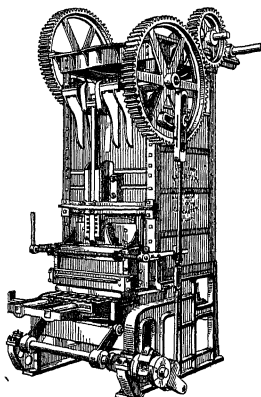
Whatever the kind of brick to be made, it is seldom molded from one clay alone, a mixture of clays being used, or else a mixture of clay and sand, in order to secure a material of the proper plasticity, shrinkage, etc.

Kinds of Brick. The following names, representative of different shapes and qualities, are now widely recognized. *Air brick*, hollow or pierced brick built into wall to allow passage of air, *Arch brick*, a term applied to either wedge-shaped brick, used for the voussoir of an arch, or to brick taken from the arches of a kiln. The latter type are hard-burned and sometimes even rough and twisted by excessive heating, *Ashlar brick*, a term often applied to certain brick, whose one edge is rough chiseled to resemble rock-faced stone, *Common brick*, any brick used for ordinary structural work, where appearance is of minor importance, *Fire brick*, one that stands a high degree of heat, *Flashed brick*, those face brick whose surface has been darkened by special treatment during firing, *Hollow brick*, those molded with hollow spaces and used for partitions, *Norman tile*, brick having the dimensions $12 \times 2\frac{1}{4} \times 4$ inches, *Ornamental brick*, those whose surface is ornamented with a relief design, *Pale brick*, underburned brick, *Paving brick*, those of low absorption and good abrasive resistance, suitable for paving purposes, *Pompeian brick*, of same size as Roman tile, but having a brown body

with iron spots and flashed edge, *Pressed brick*, a loose term, applied to any smooth-faced and sharp-edged brick, *Roman tile*, a brick $12 \times 1\frac{1}{2} \times 4$ inches, *Rough-textured brick*, a style now much used, made by the stiff mud process and having a roughened surface. They are known under patented names, such as Tapestry, Hightex, Devonshire, etc., *Salmon brick*, imperfectly burned ones, *Sewer brick*, a general term applied to common brick burned hard enough to be practically nonabsorbent and, therefore, adapted for use as sewer linings.

Brick Manufacture. All bricks go through the same stages in the process of manufacture, viz, preparation, molding, drying, and burning. If the clay or shale is very hard, it needs a preliminary crushing before it is mixed to a plastic mass with water, as is necessary for all processes of molding except the dry-press method. This mixing or *tempering*, as it is called, is done in different types of machines, such as a ring pit, pug mill, or wet pan.

Molding was formerly done by hand, and this method is still followed at small yards, or for the manufacture of special shapes, and certain kinds of fire brick, but machine molding is becoming more and more common. Molding machines are of the soft-mud, stiff-mud, or wire-cut, and dry-press types. Soft-mud machines consist of an upright receptacle of wood or iron, containing a knife-bearing, revolving central shaft, with curved arms at the bottom to force the clay into the press box. The molds are sanded, then fed in automatically beneath the press box. After the molds are filled under pressure, they are moved forward to the delivery table. The bricks made by this process show five sanded surfaces, a sixth rough one, and possess a homogeneous structure. Stiff mud



STEAM-POWER SOFT-MUD BRICK MACHINE

machines treat a stiffly tempered clay, which is forced through a rectangular die by an auger, which sends out a continuous bar of the material. This bar is cut up into bricks, either by parallel wires set on a frame or else by means

of a revolving automatic cutter. Stiff-mud bricks have four smooth surfaces, and two rough ones produced by the cutting actions of the wires. They sometimes show an objectionable laminated structure, which is specially pronounced when very plastic clays are used.

Dry-press machines use a pulverized, screened clay, which is fed from a hopper through canvas tubes or chargers, into the molds, where they are subjected to strong pressure. Dry-press bricks have smooth surfaces and sharp corners and edges. They often show a granulated texture, and unless hard burned are liable to be more porous than brick molded by the other processes.

Soft-mud and stiff-mud brick have to be dried before they are burned. This may be done in the open air, under covered sheds, or in tunnels warmed by artificial heat. Burning is done in kilns (q.v.) and the temperature reached depends on the clay and hardness of product required. Common brick are rarely fired above 1050° C., while face brick may reach a temperature of 1200° or 1300° C.

Testing of Brick. Structural brick should be tested for crushing strength, transverse strength, absorption, frost, and fire resistance. Paving brick are tested for crushing strength, frost, and abrasive resistance. Fire brick must be tested for absorption, refractoriness, and resistance to load when heated to a high temperature. Enameled brick should be specially tested with reference to opacity and smoothness of enamel, and its freedom from tendency to craze.

Bibliography. For further information consult: Wheeler, *Vitrified Paving Brick* (Indianapolis, 1895); Ries and Leighton, *History of the Clay-Working Industry in the United States* (New York, 1909); Searle, *Modern Brickmaking* (London, 1911); Ries, *Building Stones and Clay Products* (New York, 1912); Bourry, *Treatise on Ceramic Industries* (London, 1911); *Transactions American Ceramic Society*, vols. i-xv (Columbus, Ohio). See also CLAY; PUG MILL; DRY PAN; KILN; FIRE BRICK; PAVING BRICK.

Archæology of Brick. Throughout antiquity two kinds of brick were used, the crude or sun-dried and the kiln-dried or fired bricks. Brickmaking was invented in Babylonia, where nature had provided no other building material, there being no quarries or forests; and if, as is asserted by eminent authorities, the earliest civilization was formed in Babylonia, bricks may be deemed the earliest material used in permanent construction, as well as the basis for the invention of the arch, dome, tunnel, and other methods of vaulting. Buildings made of bricks have been discovered dating long before 4000 B.C. The same processes were followed in Egypt, where, however, the use of brick was not nearly so general, as stone quarries were abundant. Assyria followed Babylonia far more closely, using stone hardly at all, except occasionally for foundations and facings. In the preparation of crude bricks, the clay, mixed with finely chopped straw with a fixed proportion of water and thoroughly kneaded, was shaped in molds varying in size from 14 to 16½ inches square and from 2 to 4 inches thick. The Babylonians allowed the bricks to dry thoroughly before use, but the Assyrians were satisfied with brief and imperfect desiccation; for usually it is possible to detect separate courses and even separate bricks in Babylonian ruins, but in the Assyrian walls all

individuality has been lost through the adhesion of moist surfaces.

The kiln-dried bricks were used in much smaller quantities, for facing the masses of crude brick so as to preserve them from disintegration, especially by water, and for thin and inner walls. These bricks were burned by wood fires in ovens or flare kilns. They also were commonly square, somewhat smaller than the crude brick, about a foot in length and breadth. Usually one of their flat sides was stamped with the names and titles of the reigning king, and this side was laid downward. These bricks have been the best means of fixing the dates of many temples and palaces in Babylonia and Assyria. Besides the regular-sized burned bricks, others were molded in special shapes and sizes; segments of circles for use in columns; wedge-shaped, for use in arches; triangular, for corners, even convex. Undoubtedly the Babylonians deserve the palm for both quality and variety. The bricks were laid in liquid clay, lime mortar, or bitumen. According to Herodotus, in building the walls of Babylon the clay from the trenches was used for making the bricks, which were then laid in "hot asphalt for cement, and between every thirtieth course of bricks placing mats of woven reeds." (Cf. Gen. xi. 3, for the building of the Tower of Babel.) A third form of brick used by Babylonians and Assyrians was the enameled brick, in which the body of the brick was only lightly fired so that the enamel could better penetrate.

We do not associate bricks with the Greeks, yet it is certain that among them crude bricks were in general use, especially in the earliest times. At Troy, Tyrins, and other cities of the Mycenaean age, such bricks formed the constructive material of houses and palaces, together with wood. In fact, this seems to have been the case with the Hittites and other early Mediterranean peoples. For this reason only the stone foundations remain of most structures, as crude bricks, when used for thin walls, cannot last. When in historic times the Greeks had in general substituted stone for wood, crude brick, and terra cotta in their public buildings, they still often used crude brick for city walls, because, as Pausanias says, it is "safer against the shock of military engines than either burnt brick or stone." There were two sizes: 14½ inches square for public buildings; 11½ inches square for private buildings; and half bricks, to be used in alternate courses. Burned bricks appear hardly to have been used at all by the Greeks until after the Roman conquest. The Greeks called crude bricks *plinthoi omai*, and fired bricks *plinthoi optai*; the Roman names were *lateres crudi* and *lateres cocti* or *coctiles*.

The Romans began by using crude bricks almost exclusively. Vitruvius, Pliny, Columella, Varro, and other Latin authors give interesting details as to their manufacture. An especially choice kind was made in parts of Spain and Asia Minor, so light that they would float in water. They also resisted dampness. It was considered advisable to let bricks dry for two years before use, but the laws of Utica required five years. The best period for manufacture was said to be May, because summer bricks dry so quickly on the surface that they retain an internal dampness which causes cracks. The Roman brick was smaller than any hitherto made, and the square form was for the first time abandoned. The norm was 12 × 6 inches. Triangular bricks

were also used for facing walls of rough concrete. When the Empire began, under Augustus, the Romans had largely substituted fired for crude brick in both private and public buildings, and the adoption of concrete for heavy walls, faced with fired bricks, in place of the earlier stone walls, gave permanent prominence to this kind of brick in construction throughout the civilized world. The modern Italian bricks have preserved many qualities of the old Roman ones, which were substantially tiles, beaten flat and dried on the ground, then stacked edgewise in the furnaces on crosspieces or on the floor itself. Roman-brick furnaces have been found on sites in Italy, Gaul, Germany, England, etc. In laying them the mortar bed was prepared first, and the brick laid with both hands. The Romans not only brought back the Babylonian popularity of brick, but also revived Babylonian methods. They added an inscription to their molds, bearing the name of the reigning emperor, magistrate, contractor, or manufacturer, of great value in identifying and dating buildings. They also used a variety of shapes to suit all purposes and constructive forms. Such bricks verge on terra cotta (qv), under which head the combination of plastic earthenware with brickwork will be described. A geographical survey will show that brick did not become equally popular in all parts of the Roman Empire. For instance, in Syria, in north Africa, in the south of France, and in Asia Minor, the Greek tradition of stone construction was maintained nearly intact. When Christian architecture arose, the solid Roman concrete construction was abandoned, and brickwork became even more prevalent, though stone was still used in the regions just named, except that brick, being adopted at once by Byzantine architecture, drove stone out of most Hellenic lands by the seventh century. But the universal decadence affected even brickmaking. All the basilical churches being of brick (except in Syria, etc.), it is easy to compare their quality in different centuries. Often the bricks were drowed in mortar, especially in Gaul. Really good brickwork does not return until the twelfth century in the West. But meanwhile the good traditions had been maintained in the East, not only by the Byzantines, but by the Mohammedans of Persia, Syria, Egypt, etc. The Persians developed an especially important school of fine architectural brickwork which culminated in the Sufi period (1494-1600) and in which enameled tiles were used for the richly colored exterior decoration. The Byzantines soon sought to vary the plain brick exteriors by making a facing of alternate courses of stone or marble and bricks and by laying the bricks so as to form panels and patterns. Churches thus constructed begin to be numerous in the ninth and tenth centuries (e.g., the Theotokos, Constantinople, the Apostles, St. Bardias and St. Elias, Salonica, Misra churches). It was Byzantine art which invented decorative brickwork, for that of the Romans was always perfectly plain. Hence it passed into the Romanesque art of Italy in the eleventh century, through such monuments as Santa Fosca, at Torcello, and San Donato, at Murano. Thence arose two really decorative schools of brick architecture—the earlier and finer in northern Italy, the second in northern Germany. It is true that there is considerable good brickwork in the south of France. Its largest monument,

St. Sernin at Toulouse, is partly of brick, and the convent of the Jacobins, at Toulouse, is a most artistic brick structure, and wall patterns were sometimes obtained here by bricks of different colors, or a mixture of stone and brick, especially during the Renaissance. But Italy remained preeminently the home of brick construction, and the Lombard school solved the problem of combining it with details in marble and terra cotta, as well as by inventing a wonderful variety of molded bricks. Its results still serve as models. Mr. Strutt's book, *Brick and Marble Architecture of the Middle Ages in Northern Italy* (London, 1855), came as a revelation of possibilities. Pavia, Bologna, Cremona, Milan, Bergamo, Brescia, Verona, Vicenza, and many more cities are full of churches and town halls built entirely in this style, between the eleventh and sixteenth centuries. The style reached its culmination in the Gothic period of the thirteenth and fourteenth centuries. The different materials were variously combined. In the Merchants' Exchange at Bologna the shafts, tracery, and balcony are of marble, the capitals and archivolts of terra cotta, and the rest of brick, but in many cases most of the detail is obtained purely by pressed bricks. Brickwork was used also in Tuscany, Umbria, the Roman States, and in other regions, but not as generally or effectively. Spain also used it largely in the region between Saragossa and Toledo, and so did Flanders. But it was in northern Germany, especially in Brandenburg and Pomerania, that a second original note was struck, throughout the Middle Ages and the Renaissance, in such cities as Lubek, Hamburg, Brandenburg, Stralsund, Jerschow, Breslau, etc. The great gate towers are imposing, the churches and houses are characterized by gables—often stepped—of enormous size and a single pitch. There is less variety and richness of detail than in Italy, less combination with marble and terra cotta.

During the sixteenth century the use of brick in architecture made considerable advance in France, and during the seventeenth in England. The east wing of the Chateau of Blois, built during the closing years of the fifteenth century, ushered in the adoption of brick in monumental secular buildings, of which another early example is seen in the charming Manoir d'Ango. Under Henry IV, brick and stone were used together, the stone in quoins and for window dressings, and this practice has continued to the present time. At Fontainebleau and Versailles there are parts or adjuncts of the royal palaces built in this way, the reign of Louis XIII was especially prolific in such structures. In England the use of brick, previously confined chiefly to the fillings of half-timber structures, extended rapidly under Henry VIII, as in the earlier Hampton Court buildings, the St. James's Palace, etc. Under Queen Elizabeth and James I it became a common material for even the larger manor houses, and the introduction of the Italian style under Charles II did little to arrest this progress. A majority of the "Queen Anne" mansions are of brick, which in the eighteenth century nearly drove out the use of stone except for the most important monuments. But brick was handled with less artistic skill in England than in France. In Italy the artistic use of brick declined in the Renaissance, there are few if any late works of importance in this material. In the United States

brick was, until about 1880, employed only for ordinary routine construction, for backing stone-faced walls, and for private houses and schools, but excellent work had been executed, both in the South and in New England and Pennsylvania during the Colonial period. With the revival of architecture that set in between 1876 and 1880, there began a remarkable development in the manufacture and use of both brick and terra cotta (q.v.) and there is no country that commands such an extraordinary variety of kinds, colors, and forms of both these materials as the United States, or where it is at present more artistically and sympathetically treated in the best architectural practice. See ARCHITECTURE. For bibliography, see BRICKWORK.

BRICK CLAY. A term applied to almost any kind of plastic clay or shale of low grade. Such a clay shows a high percentage of fusible impurities and burns to a red or buff color. Brick clays are very widely distributed, underlying large areas in many parts of the United States and other countries, and belonging to a wide range of geologic formations. See BRICK; CLAY.

BRICKLAYING. See BRICKWORK; BUILDING, MASONRY.

BRICKS WITHOUT STRAW. A novel by Alphon W. Tourgée (1880).

BRICKWORK. The art and trade of building with brick; also the product of this art. The articles BUILDING and BRICK describe the nature and uses of this material and the history of its use; this article is concerned only with the technic of the art, which is one of the oldest of all the arts of building.

The essential quality of brickwork, which distinguishes it from all forms of stone masonry, is due (a) to the small and uniform size of the units; (b) to the mortar which cements them into a homogeneous fabric; (c) to the color of the bricks and sometimes also of the mortar. The small size of the units (in modern work generally 8×4 or $4\frac{1}{4} \times 2\frac{1}{4}$ or $2\frac{1}{2}$ inches) makes them easy to handle and creates possibilities of the greatest variety of texture in the surface of the wall, while their regular shape enables the bricklayer to build rapidly and to bond securely. By the use of thick or of close joints (showing respectively more or less of the mortar), by the use of tinted mortar, by different arrangements in the courses of bricks, and by the use of bricks of different colors and textures, it is possible to produce a remarkable variety of effects even in a smooth wall surface.

The chief essentials of good brickwork are of course excellence of materials and excellence of workmanship. Good bricks are of good clay, thoroughly burned, of the desired color, regular and uniform in size and shape. The mortar or cement must be of the right composition and consistency (of sand and lime, sand, lime, and cement, or sand and cement. See MORTAR; CEMENT). The workmanship must be such as to produce perfectly straight horizontal mortar joints of the proper thickness; vertical joints properly "broken" (i.e., not continuous through successive courses, but accurately aligned vertically), and a perfectly vertical face to the finished wall or pier. Moreover, in order to secure solid and homogeneous masonry, the bricks must be well bonded. *Bonding* is the laying up of the bricks in such manner that they interlock and thus tie all the parts of the work into a homogeneous structure. A *stretcher* is a

brick laid parallel to the face of the wall, a *header* is one laid at right angles to the face of the wall. In the face of a wall, therefore, a *stretcher* exposes its long edge, a *header* its end. A *closer* is a fraction of a brick less than a half-brick, inserted to complete a course whose length is not an exact multiple of the brick sizes. In *English* bond the courses are alternately of headers and stretchers; in *Flemish* bond each course is composed of alternate headers and

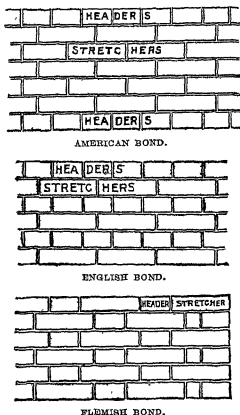


FIG. 1. COMMON BRICK BONDS.

stretchers. In the common *American* bond each sixth or seventh course is composed of headers, the other courses of stretchers. (See Fig. 1.) *Clip* or *diagonal* bond is laid up by clipping off the corners of the stretchers diagonally, and laying diagonal bonding bricks into the notches thus provided: this method does not show on the facing, which is composed wholly of stretchers. There are other methods of bonding, but these four are the most common. In the best work the facing and backing are laid up together with frequent bonding; but where the facing is laid up with close or fine joints and the backing less carefully with heavier joints, the courses of backing and facing do not "range" or reach the same level except at intervals of many courses, unless split bricks or clips are used in the backing. Hence in such work strap-iron anchors, bedded in the mortar of the horizontal joints, are sometimes used to tie the facing and backing together; but this does not bond them together into a monolithic unit, as is the case when all the work is laid up with equal courses well bonded together. Chimney flues, pipe chases, fireplaces, oblique corners, and circular structures require especial care and skill in forming them; so also the shaping of splayed or stepped window and door jambs and the building of arches and vaults. Usually the window boxings and the rough frames of doorways are set up in place and the brickwork built up to them. Arches and vaults are built upon dismountable wooden frames or molds called *centrings*, removed after the mortar has hardened or "set."

Brick arches are laid up in superposed concentric half-rings of headers, called *voussoirs*, which are in some cases bonded together by long radial stretchers at regular intervals, but arches in the facing are often laid up entirely of radial stretchers, or *voussoirs*, ground to the proper radial taper (Figs 2 and 3) Where

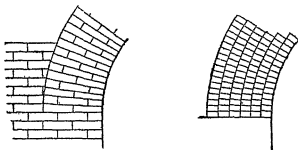


FIG 2 TYPICAL BRICK ARCHES

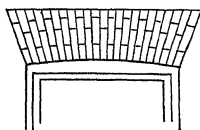


FIG 3 FLAT BRICK ARCH

stone quoins and window dressings are used with brickwork or stone facing with brick backing, it is desirable to make the stone courses range with specific numbers of brick courses, for this purpose the thickness of the mortar beds between the brick courses must be specified, this is done by requiring a given height for so many courses of brick, as 5 courses to 13 inches, or 9 courses to every 2 feet, or 8 courses laid up not to exceed by more than 2 inches the height of 8 courses piled dry. As the laying up of the facing of the wall proceeds, the mortar joints are either *struck*, i.e. carefully dressed by a stroke of the trowel, or *raked out* to a depth of a quarter- or half-inch, to be later *pointed up*, i.e. filled with finer mortar of the right whiteness or color, which is then either struck or in some cases molded into a slight relief.

Special forms of brickwork employ specially trained bricklayers among these are the hollow-brick flat arched fillings between the beams of fireproof floors (see FIREPROOF CONSTRUCTION) and various other constructions with hollow brick and tiles, the building of circular chimneys, the laying up of decoratively patterned wall facings, the setting of enameled brick and tile wall linings and wainscots, and the construction of GUSTAVINO, VAULTING. See GUSTAVINO, VAULTING.

Bibliography For modern American practice, consult many articles in the *Architectural Record* and the *Brickbuilder* periodicals, also Kidder, *Building Construction and Supervisance* (New York, 1900), and Magnus, *Bricklaying* (an excellent little handbook) (New York, 1900). For European practice and history of the art, Chabat, *La briquerie et la terracotta* (Paris, 1886), Degen, *Les constructions en briques* (ib., 1860), Street, *Brick and Marble in the Middle Ages* (London, 1874), Gruner, *Terra-Cotta Architecture of Northern Italy* (London, 1867), Stehl, *Der Backsteinbau romanischer Zeit in Oberitalien und Nord-*

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BRIDE, BRIDAL, brī'dal (AS *brīð*, betrothed, OHG *brāt*, Icel *bráðir*, bride, Goth *brāths*, daughter-in-law, cf Gk *νύμφη*, *nymphē*, daughter-in-law, bride—probably from *brūn*, to cook, brew, make broth, in allusion to her duties in the primitive family) The word 'bride' is common to all the Germanic languages, as well as to Welsh (Ger *Braut*, Welsh *pryd*), and signifies 'betrothed' or 'newly married'. Alone, the word denotes the newly married woman, with the addition of the syllable *groom* (a corruption of *guma*, Lat. *homo*, a man), it denotes the newly married man (AS *brīðguma*, Ger *Brautigam*). Bride is the base of a variety of terms connected with marriage, as "bride favors," "bride cake," etc. Bridal is for *brideale* (AS *brīðeal*, the marriage feast). Bridesmaids, or attendants of brides, appear to have been customary among the Anglo-Saxons and are mentioned in early accounts of marriage ceremonies. A part of their duty consisted in dressing and undressing the bride.

Bride Favors are small knots of white ribbon which are pinned to the breasts of those who are in attendance at weddings. The origin of the bride favor is said to be the true lover's knot—something symbolical of the union of hearts and hands on the occasion.

Bride Cake is also symbolical in its origin. The ceremony used at the solemnization of marriage among the Romans was called *confarreatio*, in token of a lasting union between the man and wife, with a cake of wheat or barley (*far*). This is still suggested in that which is called the bride cake used at weddings. The old English and old Scottish custom of breaking a cake over the head of a bride on entering the new dwelling perhaps points to a usage of the most remote antiquity—the sprinkling of wheat as a token of plenty.

BRIDE OF ABYDOS, THE A narrative poem by Byron, described as a "Turkish Tale" (1813). Its rough draft was written in four nights, and 200 lines were later added. It was adapted for the stage by Dimond five or six years afterward.

BRIDE OF LAM'MERMOOR, THE A novel by Sir Walter Scott, further described as "a legend of Montrose." It is one of the *Tales of My Landlord* series and was published in 1819. Calcraft's (Cole's) *Bride of Lammermoor* and Mervale's *Ravenswood*, both dramas, were taken from it, as was the libretto of Donizetti's opera, *Lucia di Lammermoor*. See ASHTON, LUCY. Consult *London Monthly Review*, vol. XXIX, p. 387.

BRIDE OF MESSINA, THE (*Die Braut von Messina*) A tragedy by Schiller, founded on the *Œdipus Tynannus* of Sophocles, produced at Weimar, March 19, 1803. It is technically one of Schiller's most finished works.

BRIDE OF THE RHINE A name sometimes given to the river Moselle.

BRIDE OF THE SEA A name of Venice, referring to the traditional rite of marrying the city to the Adriatic Sea in medieval times.

BRIDEWELL A well between Fleet Street and the Thames, dedicated to St. Bride, which has given its name to a palace, parish, and house of correction. A palace, described as

"a stately and beautiful house," was built there in 1522 by Henry VIII, for the reception and accommodation of the Emperor Charles V and his retinue. King Henry himself also often lodged there, as, for instance, in 1525, when a Parliament was held in Blackfriars; and in 1529, while the question of his marriage to Catharine was argued. In 1553 Edward VI gave it over to the city of London, to be used as a workhouse for the poor, and a house of correction "for the strumpet and idle person, for the rioter that consumeth all, and for the vagabond that will abide in no place." Queen Mary having confirmed the gift, it was formally taken possession of in 1555 by the Lord Mayor and corporation. The Bridewell was afterward used for other persons than the class above named, and at last became a place of punishment till its removal in 1864.

BRIDGE. An artificial stream crossing; an elevated crossing in any location; a roadway across a river, giving passage below to the stream, or over a road, valley, or other land area, provided the structure has openings through it so that it consists of isolated supports and (one or a succession of) openings or *spans*. Generally a bridge carries a road or a railway; but it may carry a canal or water conduit (*aqueduct bridge* or *aqueduct*), or may support power-transmission shafting or a conveyor, the character of the structure being the same in all these cases. A bridge extending over dry land alone, or crossing at considerable height above a wide valley containing a relatively small stream, is usually called a *viaduct*, but this term is not specific. *Culvert*, a passage for a drain or small brook through an embankment, is related to bridge. An arch bridge made very short and wide, its width considerably exceeding its span, becomes a culvert. Constructively a culvert is so narrow (or represents a bridge of such short length) that very simple means of spanning the opening suffice, e.g., a stone lintel slab or stone or concrete vaulting of short span. In railway and road work culverts of greater width than 5-8 feet are classed with bridges.

Elementary forms of bridges are: a log or set of logs laid across a brook, resting on the two banks; an arch spanning between the rock walls of a gorge; a footpath laid on ropes stretched from bank to bank of a narrow valley. Such forms (the arch very rarely, however) are found among primitive races, and in the wilds are occasionally provided by nature (a fallen tree trunk bridging a stream, a rope of vines connecting trees on opposite banks). The bridge of one span is an outgrowth of these. The stepping-stone causeway improved by laying sticks or saplings to connect the stones is the prototype of the bridge of several spans. Wooden piles driven into the river-bottom soil to form bridge supports intermediate between the banks enabled the log or beam structure to be adapted to wider streams (trestle bridge or trestle, a form still widely employed for wooden bridges across valleys or across streams where passage of ships does not need to be provided for). The same principle of arrangement with use of boats for intermediate supports produces the *pontoon bridge* (e.g., the crossings of Darius, Xerxes, Alexander, over the Bosphorus, Hellespont, Euphrates), used even to-day in isolated cases. Piers built of stone, as intermediate supports for the wooden carrying members, make an advanced type of wooden-beam bridge.

Bridges were built by the most ancient races known to history. Wooden-beam bridges appear to have been the only kind known to the ancients (except the Chinese, who knew the arch and built stone-arch bridges) until the Roman age. The Romans used the arch very extensively in bridge construction; their best specimens existing to-day are in the great aqueducts built in Italy, Gaul, and Spain. Wooden-beam bridges were constructed in large numbers, especially in the earlier centuries, and later probably also wooden arches (Trajan's Danube bridge), besides the more elaborate and permanent stone arches.

The development of bridge construction for the next 10 centuries was the continued application of the stone arch for permanent or monumental structures and the wooden-beam type (nearly always on stone piers or stone-filled wooden cribs) for cheaper bridges. There being no railways, only roads and the few aqueducts required bridges. Feudal lords and governments usually constructed them, but bridge privileges were often farmed out to private parties, who built the bridge and took toll of the traffic over it. One or two orders of monks specialized in bridge building.

Leonardo sketched truss bridges, and Palladio probably built several. Two semitruss bridges were built in Switzerland about 1760. These attempts were preparatory to the truss invention and development of the nineteenth century. Cast iron was used for arch bridges as early as 1779, when Abraham Darby built a cast-iron arch over the Severn at Coalbrookdale, England. The use of cast iron (cast in pieces adapted to be set together like arch blocks or voussoirs, but in two or more separate ribs instead of in full arch barrel as with stone) extended considerably in the next 50 years, one of the best examples being Southwark Bridge over the Thames, London, 1819, with spans up to 240 feet. Timber truss-bridge construction did not develop, as the nature of the truss was not well understood, until about 1800, and not much until the railway era (after 1840). Combination trusses of arch rib and truss frame were invented in America about 1800, by Burr, true trusses by Palmer (1804), Long, Town, Howe (1840), Whipple, Bollman, Fink, Pratt (1844), and others. About 1800, also, suspension bridges using chains laid over towers on the banks, supporting a level roadway by hanger rods from the chains, were built by Finley in America and later (1814-23) by Brown and Telford in England.

The needs of railways now brought inventions and development marking the birth of the modern bridge. The first bridge wholly of wrought iron was built in 1823 over the Gaumless River, England, but wrought-iron bridges did not find extensive use till 30 years later. Plate-iron tubular bridges were built in England by Robert Stephenson (Memai Straits), 1847-50, and truss bridges were made efficient and economical in America. The wooden truss, and wooden trusses with iron tie-rods, led to combination cast- and wrought-iron construction (about 1850), and later to wrought-iron trusses. The latter depend on rolled plate, shape iron, and rivets for connection. Iron-bridge building then experienced high development, the full theory of truss-bridge construction and practical details being worked out; all other forms of bridge took a very subordinate position after 1860, and cast

iron was practically abandoned after 1870. In the middle of the eighties rolled steel took the place of rolled wrought iron and is now exclusively used. Beginning about 1905, nickel steel (steel alloyed with a small amount of nickel) has been employed in some of the largest bridges, where its superior strength is of decided advantage.

Soon after 1890 concrete came to be used rather extensively for arch-bridge construction. Reinforced concrete (concrete with imbedded steel rods, the steel taking tensile stresses and the concrete compressive stresses) also was developed, and several systems of arch reinforcement were exploited. Great advance in reinforced-concrete practice since 1900 has brought about the use of reinforced-concrete beams or solid girders, and occasional use of trusses, besides developing extensively the knowledge and practice of arch construction in reinforced concrete. In this short period the stone arch, after several thousand years' supremacy in the construction of permanent bridges, has been largely displaced by the arch of concrete and reinforced concrete.

Progress of the Bridge-Building Art. Length of span is an approximate measure of difficulty of achievement in bridge building. The ancients did not exceed spans of 100 feet with their masonry arches. To-day this type (including here concrete arches) has progressed to 328 feet. This advance is small enough to suggest the inherent limitations of the type. The characteristic bridge of the modern era, however, the steel bridge, has been built in spans exceeding 1000 feet, the greatest being the cantilever truss bridge over the Firth of Forth, Scotland, whose maximum span is 1710 feet (1890). The Quebec cantilever bridge over the St. Lawrence River, spanning 1800 feet, more than one-third of a mile, was begun in 1911. These figures are to be compared with 30 or 40 feet, the greatest spans of the ancients' simple beam bridges. However, from another viewpoint the comparison of span lengths is wholly inadequate to express the difference between ancient and modern bridge work, since the fundamental elements of modern civilization, the use of power machinery and large-scale working of iron, are essentially concerned in bridge building of to-day.

GENERAL ANATOMY OF THE BRIDGE

A bridge consists of main carrying frames, supports, anchorages, lateral bracing (wind bracing), stiffening or sway bracing, and roadway structure (floor). The floor is usually an independent part, which can be removed without affecting the stability or integrity of the bridge, the other parts, however, must be in combination to make the structure stable and give it strength. Supports of stone or concrete belong to the foundation or *substructure* of the bridge, the other parts constituting the *superstructure*, or bridge proper. Steel or wooden supports (as viaduct towers, posts or towers of suspension bridges, etc.) are included in the superstructure. **Roadway.**—The road crossing the bridge requires pavement, a railway requires rails, ties, and supports for the ties in canal and other special bridges corresponding elements are necessary. The supporting members of the floor, which transfer the roadway loads to the carrying frames, comprise usually longitudinal

beams (*stringers*) on which the planking or other floor slab rests, and transverse beams (*floor beams*), which carry the stringers and whose ends are attached to the carrying frames (tusses, girders, or the like). The type and detail construction of the floor have direct influence on the arrangement of the bridge. Traffic requirements determine the kind of floor used.

Carrying Frames.—These correspond to the log or vine rope of the aboriginal bridge. While a single log might do as a river crossing for savages, any other form of roadway demands at least two carrying frames side by side some distance apart (tubular bridges, see below, are an exception). In actual bridges there are normally two, less frequently three, four, or more, if two, they are near the outer borders of the floor. Their exclusive function is to resist vertical actions. The kind of carrying frame employed (beam, truss, arch, suspension cable) characterizes the bridge. In the stone arch the arch barrel, which is the carrying portion, is usually a unit, though one of considerable width, it may be regarded as a plurality of narrow arch rings set close together and firmly interconnected. Modern concrete arches (and some stone arches) have two (or three) separate arch rings, like the tusses of a steel bridge, connected and stiffened laterally by transverse members, the same arrangement is found in steel arches.

Wind Bracing.—The carrying frames, being long, narrow, and high, lack stability and rigidity and offer little resistance to wind pressure, centrifugal forces (if the roadway is on curve), and lateral vibration. Bracing connecting them supplies such resistance. The primary lateral bracing, wind bracing, is always a horizontal truss, or its equivalent. The lateral bracing of a steel bridge consists of transverse struts between opposite tusses, at intervals, and crossed diagonals in the resulting rectangular panels, which arrangement is typical of all forms of wind bracing. Such bracing is often applied at both top and bottom edges of the carrying frames (in the planes of top and bottom chords of the main trusses), but sometimes only in the plane of the roadway, or of the compression chord, or of the chord which bears most directly on the supports.

Sway Bracing.—Bracing in transverse vertical (sometimes in inclined) planes is used to supplement the wind bracing and stiffen the structure against longitudinal twisting and, in the case of a single plane of wind bracing, to extend the wind-bracing effect to the plane of the other chord. In truss bridges it is usual to place at each post of the truss a brace frame of crossed diagonals and transverse struts called *sway frame*, when these frames are above the roadway, they extend only part way down the posts and are *partial frames*. The principal portal frames are those at the ends of the span (over the piers or supports), where the lateral pressure of the upper wind truss must be transferred down to the supports.

Supports and Anchorages.—The end supports of a bridge are its *abutments*, which name originally applied to the end supports of arches. The abutments usually have to retain the earth of the approach roadway, besides supporting the bridge. Intermediate supports are *piers*, or, if two or more simple posts, they are called *bents* (posts in a single transverse plane), or *towers*. Wood trestle bridges rest on bents of wooden

frames or driven piles; steel bridges sometimes have intermediate bents or towers (in high viaducts usually the latter). Stone or concrete piers are of the usual type. They are founded below the surface of the soil or river bottom at such depth as to reach strata of adequate bearing power and are built with width of base and thickness of body sufficient to enable them to resist all forces transmitted from the bridge. (See ABUTMENT; FOUNDATION.) Steel bents or towers used as bridge supports are themselves supported on masonry piers extending above ground or water level. Timber bents, if not composed of driven piles, rest on a row of piles, or sometimes on a simple transverse distributing beam or *mud sill* below ground. The carrying frames do not rest on the piers and abutments directly, but *shoes* or *bearing plates* are interposed to distribute the bridge load over a sufficient area of the masonry; they often have rocking or sliding surfaces to allow for small movements of the bridge due to deflection, temperature expansion, etc. Shoes are of cast iron or cast steel, or are riveted steel assemblages. Short bridges may have simple flat steel bearing-plates in place of shoes.

*Anchorage*s hold the bridge in place (ordinary bridges), resist uplift (cantilever bridges), or resist outward pull and uplift (suspension bridges). The former are simple vertical anchor bolts fastening the shoes to the piers and abutments. Cantilever bridges have anchor bolts or bars of large size carried down into the abutments far enough to engage a large mass of masonry. The same applies to the anchorages of suspension bridges, except that the bars or bolts are usually inclined and the arrangement is elaborate in proportion to the large pulling forces to be resisted.

SERVICE OF THE BRIDGE

Primarily a bridge has to support vertical loads—its own weight (*dead load*) and the variable traffic loads (moving load, *live load*) and the weight of snow. It must also resist wind pressure, which acts horizontally (sometimes exerts a lifting effect), and in the case of railway bridges the longitudinal push or drag due to the arrest of momentum of a train when the brakes are applied. These are definite quantities which enter numerically into the design. Two other important agencies attack the structure: variations of atmospheric temperature, causing the bridge to expand and contract (or, sometimes, distort from its normal shape); and the disintegrating influence of exposure to the weather, which destroys paint, rusts iron, rots wood, and dissolves stone and mortar. Temperature effects are mechanically provided for in the construction of the bridge, or, where they produce stresses in the bridge (arches, suspension bridges), the stresses are computed and extra strength is provided to resist them. Consideration of exposure or weathering often leads to choice of steel over wooden construction, or stone over steel, and also affects various details of the design. The bridge must transmit all the loads to its supports and must not be overstressed in any part under any possible loading or under any influences which may act on it. The proportioning to this end is the *designing* of the bridge; it is based on *stress analysis* from pre-determined loading on the bridge and *maximum permissible unit stresses* in the material.

Loading.—Since bridge traffic is fortuitous and variable, the bridge must be built for the probable greatest traffic load and the most unfavorable grouping of loads. Road or street bridges (*highway bridges*) may have to carry crowds of people, wagons, droves of animals, or special vehicles as traction engines, road rollers, motor trucks, street cars. For crowds of people 100–125 pounds per square foot floor area is a maximum for bridges. For road rollers and traction engines the weights found in the locality where the bridge will be built are taken, usually 10 to 20 tons (freight carts and motor trucks rarely exceed 5 tons). Street cars weigh 20 to 40 tons. A close sequence of heaviest vehicles may occur under exceptional conditions; the floor area outside the vehicles may at the same time be crowded with people. Railway loadings (in America, those of Europe being lighter) range up to 5000 pounds per lineal foot on one track, besides the concentrated load of the locomotive. The heaviest locomotives weigh 6000 pounds per lineal foot, and the heaviest axle load is about 65,000 pounds. The effect of the separated axle loads of the locomotive is more severe than that of the same load distributed, and therefore the actual wheel loads and spacings of the heaviest locomotive which may cross a bridge are used by the bridge engineer.

Wind pressure reaches 20–25 pounds per square foot in violent gales, but in tornadoes may reach 50 pounds and may exert uplift. Bridges are commonly designed to resist a pressure of 25 pounds per square foot on bridge and vehicles, and 50 pounds on the empty bridge (wagons and railway cars are overturned at 20–30 pounds' pressure). Longitudinal or braking forces in railway bridges may amount to from $\frac{1}{4}$ to $\frac{1}{2}$ of the weight of the train. The temperature fluctuations which may affect the bridge depend on the type, e.g., in temperate climates a massive stone arch may not experience more than 50°–70° F. maximum range, while a steel bridge is subjected to the full range of atmospheric temperature, 100°–120° F.

Impact is the abnormal stress-increasing effect of a load moving over the bridge with jarring, pounding, or vibration. A very light and flexible bridge vibrates under the step of a small party of men, and experiences stresses greater than the same load would produce if quiescent. The motion of a railway train contains many irregularities in its rolling, and in addition the lack of perfect balance in the locomotive mechanism entrains vertical oscillations, all increasing the effect of the train on the bridge. Bridge engineers allow for these abnormal effects by adding material to the parts of the bridge, under empirical rules. Numerous experimental studies of impact effects in bridges have been made, notably by Prof. F. E. Turner, but the subject is not yet on a final basis. A common rule is to double the stresses caused by live load; for long spans this rule is modified by reducing the allowance one-half in spans as long as 300 feet and still more for longer spans; impact effects are known to be most severe in short bridges, and the rule given is known to be safe. Impact allowance depends vitally on the trained judgment of the engineer.

BRIDGE MATERIALS

Until within a century and a half the only materials used for bridges were wood and stone,

except for occasional brick arches. Wood was used for the piles and cribs of the foundations, for main beams and flooring of beam bridges, and in rare cases for the voussours of arches. Stone was used in the piers (both in the form of masonry and as irregular stone filling of foundation cribs) and in the arches. Design was not based on stresses, as knowledge of the mechanics of structures was primitive, yet experience gave sufficient skill to produce fairly efficient and economical bridges.

Stone in bridges is stressed only in compression. The crushing strength of even weak building stone is adequate, durability, ease of working, etc. are more important considerations. Sound limestones and sandstones, and granite, are most used. The compressive stress on the stone should be limited to 250-500 pounds per square inch. High stresses require special attention to the bedding and the mortar joints. Strong cement mortar should be used.

Wood—All structural timbers are suitable for bridge construction. Yellow pine is most used to-day. Unit stresses of 800-1200 pounds per square inch in compression along the grain, 1000-1800 in tension, and 50-250 in shear, are employed. Shear along the grain and compression across the grain are special factors of weakness. However, deterioration is so large a feature in the life of wooden bridges that low-unit stress is most advantageous in bridges exposed to the weather. Covered bridges have stood 100 years (Waterford Bridge over Hudson River, burned 1909) with little decay.

Cast Iron—This first new material of the modern-bridge period has high compressive strength and low tensile strength and is brittle under blows. It is suited to compression only, and is now used only for angle blocks in wood-and-iron Howe truss bridges and for shoes. (A few bridges of concrete with cast-iron core have been built recently.) Stresses of 15,000-20,000 pounds per square inch are allowable.

Wrought Iron—Used in nails and bolts of bridges since early times, wrought iron was first employed as the exclusive material of a bridge in 1823, and then only in rare local instances until the Menai Straits tubular wrought-iron bridges were built by Stephenson in 1847-50. High tensile strength, toughness, and the possibility of building firm assemblages of it by riveting parts together make it an excellent bridge material. Wrought iron has a tensile strength of 48,000-55,000 pounds per square inch and a compressive strength (in columns) of about 27,000 pounds per square inch. Its shearing strength is intermediate between the two values, and therefore rivet connections can be made compact and efficient. Tie-rods with forged or threaded ends can be made for any requirement. Wrought iron in bridges may be stressed to 12,000 pounds per square inch in tension and compression, and 7500 in shear. It would be the prime bridge material to-day but for the perfecting of steel-making processes. Mild steel is very similar to wrought iron, but even stronger, and in the past quarter-century has been the cheaper. About 1885 it displaced wrought iron.

Steel—Bridge steel, unlike tool steel, is always mild or medium steel, containing only 0.10 per cent to 0.30 per cent of carbon. It has a tensile strength of 56,000 to 68,000 pounds per square inch and a column strength of 28,000 to 33,000 pounds per square inch, is fully as

tough and plastic (or ductile) as wrought iron, and is capable of use for rivets. Plates of steel are nearly equally strong with and across the grain, while wrought iron is weak across the grain of rolling. The iron bridges of to-day are all of steel. Allowable unit stresses are noted below.

Nickel Steel—Mild steel alloyed with 2 to 4 per cent nickel has been used in some of the largest recent bridges. It is 50 per cent stronger and has all the good qualities of ordinary bridge steel. For the same strength nickel-steel bridge parts are much lighter, hence in bridges whose dead load makes up the most important part of the total load (long-span bridges) the use of nickel steel reduces materially the entire load which must be supported (Manhattan Bridge, New York, Municipal Bridge, St. Louis, Cologne Suspension Bridge, Germany, and others).

Concrete—The Romans used a concrete made of ground volcanic tuff, lime, sand, and broken stone or bricks for much of their later building, including bridge construction, always with stone or tile facing. Modern concrete is very much stronger and more uniform and reliable. It is made of Portland cement, sand, and gravel or broken stone, for bridges usually mixed in the proportions 1 2 4 (by volume), then wet to pasty or soupy condition, put in place in wooden forms and allowed to harden (3-30 days) before the forms are taken down. Its crushing strength is 1500-3000 pounds per square inch. Arches experience (generally) only compression, yet are usually reinforced with steel, beams, floor plates, etc., which carry tensile stresses, always have steel rods bedded in the concrete in such a way that the rods resist the tensile stresses. The steel does not rust subsequently. The concrete is practically as permanent as stone. A few arch bridges have been built of concrete blocks molded to shapes and sizes similar to those of the stone blocks used for stone arches.

BRIDGE UNIT STRESSES

(For mild steel, nickel steel, and concrete. Approximate averages from practice, pounds per square inch.)

	Compression	Tension	Shear
Mild steel	15,000-18,000	15,000-22,000	10,000-12,000
Nickel steel	15,000-30,000	30,000-40,000	15,000
Concrete	500-700		100
Steel in reinforced concrete	10,000	15,000-20,000	10,000

(Adhesion to concrete 50 to 100)

Compressive stresses must be taken lower in columns, increasingly so for long columns (see COLUMNS), various other kinds of stress must be computed and allowed for, the above table giving only broadly characteristic figures.

BEAM BRIDGES

The aboriginal log bridge continued through ancient and mediæval times as the bridge of hewn logs or beams, and still exists in the timber trestle, the short-span bridge of steel I-beams or plate girders, and the reinforced-concrete beam (or girder) bridge. Moreover, the truss is merely a skeletonized beam, and its action in a bridge is similar to the action of an ordinary beam. Truss bridges also use solid beams as important subsidiary elements, since

the smaller space-spanning parts, the floor members, are beams.

Solid-Beam Bridges. Railway and highway crossings over small streams, 10-20 feet wide, are still often made by timber beams. A road bridge of this kind is sketched below, and the section of a railway bridge is also given (Fig. 1). The differences in arrangement of carrying beams in the two cases depend on the differences in the floor, the latter being suited to the traffic requirements. Sometimes gravel or broken-stone metaling is placed on the floor planking of road bridges, and a similar type of floor is occasionally used also for railway bridges, the ties being bedded in the ballast.

Trestle Bridges are combinations of several such beam bridges placed end to end, supported

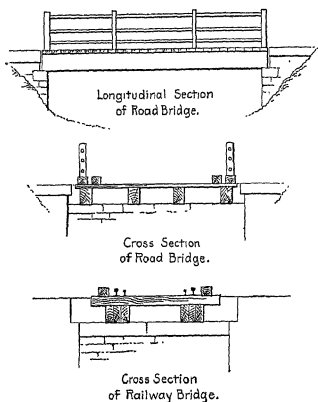


FIG. 1.

by wooden pile or framed *bents*. Trestles are still in very extensive use on American railways, though generally on the older and more important lines most of them have been replaced by more permanent bridges (steel, stone, concrete). The life of a timber trestle does not often exceed 10-15 years, on account of decay. Many trestles also are destroyed by fire, starting from brush fires or from live coals dropped out of a locomotive fire box. Trestles to-day are often built of wood impregnated with creosote, as a protection from decay; this increases the fire danger. Ballast on plank flooring has been used on some railway trestles.

Action of the Beam. A stick laid across two supports and pressed downward by a load bends. Its upper fibres are shortened and its lower fibres are stretched, and exert corresponding internal forces (*stresses*). Intermediate fibres experience stresses intermediate between these extremes, and at or near midheight of the beam there is no longitudinal stress (*neutral plane*). These stresses are the action of one part of the beam on the adjoining part. If the left-hand half of the beam be cut away from the right-hand part, forces must be applied to the cut faces in exact equivalence to the pre-

viously existing stresses, in order to hold the separated parts in place. For the left-hand part this is sketched in Fig. 2. The group of com-

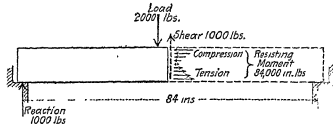


FIG. 2. ACTION OF THE BEAM.

pression and tension forces opposes the *external bending moment* or tendency of load and reaction (of the support) to turn the beam downward at the right. At the same time the vertical force along the cut face balances the excess of load over reaction. These two stresses—(1) the compression-tension group of forces or the *resisting moment*, and (2) the *shear*—are the most important quantities in the analysis and design of beams. For the formulas used in proportioning beams, see *MECHANICS*.

Steel I-Beam Bridges. The most effective resistance to bending is offered by the fibres farthest from the neutral plane of the beam, as may be inferred from the sketch above. By massing the material of a beam at upper and lower edges, leaving only a narrow web down the middle, a beam of maximum efficiency is obtained. The rolled steel I-beam is of this form; it has greater bending strength per square inch of cross section, hence makes a stronger beam out of a given amount of material than any other shape. The production of rolled wrought-iron I-beams about 1840 was an essential factor in the evolution of the wrought-metal bridge. For dimensions of rolled shapes, consult rolling-mill handbooks, *American Civil Engineers' Pocket Book*.

I-beam bridges are precisely similar in arrangement to the timber-beam bridges described above. They are used as railway bridges up to 20-25 feet span and as highway bridges up to 30-40 feet span. Such bridges usually have lateral bracing of single-angle diagonals and struts connecting the upper flanges of the opposite beams or sets of beams; this bracing resists lateral distortion of the bridge which might result from swaying of the load or from wind pressure. It also holds the upper flanges of the I-beams against *bulging* under their longitudinal compression.

Plate-Girder Bridges. The plate girder extends the application of the beam bridge very greatly; plate-girder railway bridges are used in great numbers, and spans of 130 feet are in use (Erie Railroad and others). The plate girder is a large built-up I-beam, the largest rolled I-beams being 24-30 inches deep. The construction of plate girders and their disposition in a bridge are shown by Fig. 3. The similarity to smaller beam bridges is patent; but because of its size and loading a plate-girder bridge involves certain considerations which are negligible in smaller bridges but are controlling in all large bridges.

Deck and Through Bridges.—Beam bridges always have the decking or floor resting on the beams, but in plate girders, while this is the preferred arrangement, the floor may also be located between and near the bottom of the girders, and be carried by subsidiary beams

riveted to the sides of the girders, as in Fig 3. Where head room under the bridge must be high, without raising the bridge floor, such a *through bridge* is built. The *deck bridge*, with floor resting on top of the girders, has much simpler floor construction, especially in railway bridges. The typical railway deck plate-girder bridge has the cross-ties laid directly on the top flanges of the girders, there being thus no floor framing, the girders are directly beneath the rails or nearly so (5 feet apart), except that girders as long as 100 feet are set farther apart (8-9 feet) for stability and lateral stiffness. A through-girder bridge must have the girders set far enough apart to admit railway trains (12-15 feet), and therefore requires complete floor framing, including lateral bracing between the top flanges of the stringers. In such a bridge each panel of the floor is an independent I beam bridge, supported by attachment to the

employed at both fixed and expansion ends (in the latter, over the rollers), to avoid any canting-up effect as the girder deflects under load.

Questions of Erection arise with plate-girder spans. Small beam bridges are built together at the shop, and shipped and erected as one piece, but with the large plate-girder spans this is usually impossible. Commonly each girder is shipped as one piece, set in place with a derrick or other hoist, and the floor and bracing put in last. Some large girders are not riveted together to their full length in the shop, but are shipped in two or three pieces, which at the bridge site are set on temporary wooden supports (*falsework*), so as to be in correct final position, and are then riveted together. However, girders 120-130 feet long have been shipped in one piece.

Tubular Bridges—The first important wrought-iron girder bridges were great rectangular

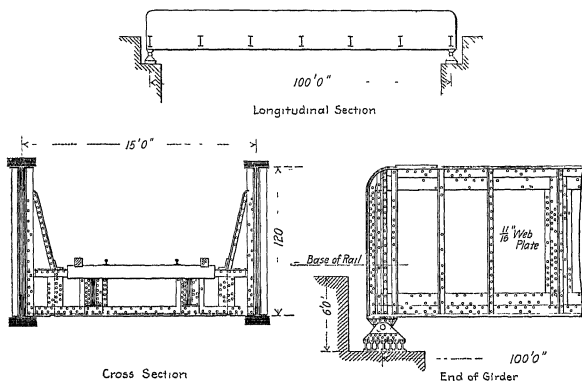


FIG 3 SINGLE-TRACK RAILWAY PLATE-GIRDER BRIDGE

floor beams. This difference in floor makes the through-girder bridge more costly than the deck bridge for railway use. In highway bridges the difference is less, on account of the width of the floor, a full floor framing being used even in the deck bridge.

Bracing—In ordinary beam bridges bracing is negligible, in plate-girder bridges it must be carefully provided, and there must also be sway bracing to hold the high, narrow girders against tipping or twisting distortion. The latter consists, in deck bridges, of brace frames in vertical transverse planes, in through bridges of triangular plate brackets connecting each floor beam with the side and top flange of the girder. Lateral wind trussing must be used in both deck and through bridges, in addition to the stringer laterals, it is not shown in Fig 3.

Expansion—On account of the length of span expansion must be provided for. The girders are bolted to their bearing only at one end of the bridge, and the other end has either smooth-planed bearing plates or a set of rollers between upper and lower plates, permitting the bridge to slide longitudinally, with very long spans, special pin or rocker shoes (see Fig 3) are

used. In these bridges the roadway is completely inclosed in the tube, floor and roof act as flanges, the side walls as webs, the former are cellular, with top and bottom plates inclosing longitudinal I-shaped stiffening ribs, while the side walls are single plates stiffened by angle bars. The Victoria Bridge over the St Lawrence River at Montreal (240-330 feet span) was built of the same type (1854 replaced by a truss bridge, 1897). The type is obsolete.

High Viaducts—Plate-girder construction finds special application to long and high railway bridges over wide valleys, where earth embankment is not applicable. Such structures are formed of a succession of plate-girder spans resting on steel towers, each made up of four columns set at the corners of a rectangle, braced together. The top of each tower is itself occupied by a plate-girder span. Usually the intermediate spans are made about twice as long as

the *tower spans*. The longest spans are in a high viaduct of the Canadian Pacific Railway 314 feet above the Belly River valley, Canada, where 100-foot intermediate spans are employed. Viaducts are erected without falsework, by a traveling hoist working on the railway track and overhanging forward the full length of one span. This traveler works from one end; it lifts and sets in place the members of the tower just ahead, then lifts the intermediate span to place, and so progresses forward. The simplicity of this erection method is a main reason for the use of the plate-girder type of viaduct. A few notable high viaducts are listed below:

SOME HIGH STEEL VIADUCTS

Name	Date	Height	Length
Los, Bolivia	1888	336	800
Goktek, Burma	1900	335	2260
Pecos	1861	321	2180
Lethbridge	1909	314	5327
Kinross	1882	301	2053
Verrugas	1872	250	575

Reinforced-Concrete Girder Bridges. This type of beam bridge, a recent development, consists of a reinforced-concrete floor slab on (usually) two reinforced-concrete girders. The girders are designed for bending moment and shear like all beams, and the floor slab is similarly calculated. (See REINFORCED CONCRETE.) The floor slab also serves as lateral bracing, in wide bridges it has a supporting frame of floor beams and stringers similar to floor arrangements used in steel bridges. While many bridges of this type have been built, arch construction is generally preferred when reinforced concrete is used.

TRUSS BRIDGES

Early Trusses. Two rafters tied together at the foot by a wood or iron tie form the simplest truss. The old Romans used this and also some more elaborate forms in roofs. Knowledge of roof trusses was not applied to bridge construction, however, except possibly by Palladio and by Leonardo, in Italy. In a truss (Fig. 4) each member is stressed only in direct tension or compression, hence utilizes the full strength of all its material, while in the beam the interior fibres are only partially stressed. In this fact lies the advantage of the truss. However, truss bridges were not developed from a recognition of this truth, but in their beginnings were evolved empirically, scientific study following.



FIG. 4. EARLY ROOF TRUSS.

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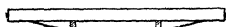


FIG. 5. BEAM REINFORCED WITH TRUSS ROD.

Beams reinforced by truss rods (Fig. 5) were used in bridges occasionally in the eighteenth century. The Rhine bridge of Grubenmann at Schaffhausen (1756) was a compound timber beam with auxiliary corbel beams of arch-like

character, the main beams absorbing the thrust of the arch. In 1764 he built a wooden solid-rib arch bridge with stiffening truss across the Limmat, Switzerland. The arch-and-truss combination appeared again in the bridges of Burr (Fig. 6), who constructed a number in the



FIG. 6. BURR TRUSS.

United States about 1800, closely similar to the Limmat bridge. Truss bridges not involving an arch were invented soon after by Palmer, Long, Town, Howe, Whipple, Pratt and others. The *Town lattice truss* (1829) became very popular, its closely spaced web system (Fig. 7) permit-

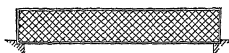


FIG. 7. TOWN LATTICE TRUSS.

ting the chords to be loaded at any point, like a beam; but bridge analysis was not advanced enough to permit correct design of details in such an intricate truss. The *Howe truss* (1840) was the first permanent one, being still in wide use. It comprises upper and lower horizontal members (*chords*) of wood, vertical iron tie-rods at intervals, and crossed diagonal struts of wood between successive rods. (Fig. 8.)



FIG. 8. HOWE TRUSS.

With angle blocks at the ends of the diagonal struts satisfactory details were secured. The Howe truss is specifically adapted to timber and is not used with iron. The *Pratt truss* (1844) is excellently suited to iron, on the other hand. In place of the vertical tension rods of the Howe, it has vertical posts, and in place of the diagonal struts it has tension rods (Fig. 9). The



FIG. 9. PRATT TRUSS.

main diagonals are those inclined downward towards midspan, the opposite diagonals (*counters*) being required only near the middle of the bridge, to take tension when the bridge is loaded on one side only. It did not become popular for wood-and-iron construction, but became the main type with wrought iron. The modified Pratt truss is the prevailing type of bridge truss to-day. Special importance attaches to the

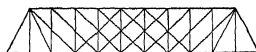


FIG. 10. WHIPPLE TRUSS.

Whipple truss because Whipple wrote (1847) the first work on truss analysis in America, as well as because his form of truss was used extensively up to 1890; though no longer built, many examples of it are still in service

(Fig 10) It is intermediate between the lattice and the Pratt, having a double system of diagonals between the chords (hence called a double-intersection truss, multiple-intersection trusses were also built with three web systems, four, etc., up to a sufficient number to make

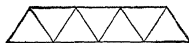
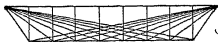


FIG 11 WARREN TRUSS

them lattice trusses) The *Warren truss*, with a single web system having no verticals, successive diagonals sloping in opposite directions, also came to the front in the middle of the nineteenth century (Fig 11) The Howe, Pratt, Whipple, and Warren trusses initiated the modern era of bridge construction

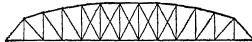
Parallel Chords were most used in trusses at first Later, trusses made deeper at midspan (where the bending moment is greatest) by giving one or both of the chords a curved or polygonal outline were brought out The bowstring truss, with a straight bottom chord joining the ends of a parabolic top chord, appeared early,



Bollman Truss



Fink Truss



Curved Chord without Subdivided Panels.



Curved Chord with Subdivided Panels

FIG 12 TWO EARLY AND TWO MODERN BRIDGE TRUSSES

originally as an arch with tiebeam, but later provided with web verticals and diagonals, making the truss complete The curved-chord truss without pointed ends, obtained by arching up the top chord of a parallel-chord truss, was later preferred and is the present standard for long spans

Long spans offer difficulties in the floor framing as the panel length increases The advantage of the Whipple truss of halving the panels was 20 years later secured in better manner by adding to a Pratt truss subsidiary trussing to form *subdivided panels* without affecting the simplicity of stress distribution

With curved chords and panel subdivision the iron-bridge truss achieved, broadly, its modern development, subsequent improvements have been mainly in details and in refinement of design. However, two other solutions of the long-panel floor problem were devised for the Forth Bridge and the St Louis Municipal Bridge In the former a complete inner subsidiary truss-bridge structure extends along from panel point to panel point, supported by transverse trusses at these points In the St.

Louis bridge, where even the subdivided panels were too long, the floor comprises main plate-girder longitudinals between the main floor beams, carrying secondary floor beams which support the stringers

Diagrams of some other truss types are shown in Fig 12

Action of the Truss The truss is a plane network of triangles whose bars are (in theory) connected by hinge points The triangle is a rigid figure, and similarly a net of two triangles (quadrilateral with diagonal) or of any number of triangles is rigid, supported at two points and loaded at any of the others, it will maintain its form except for minute deformations caused by the elastic extension and shortening of the individual bars The triangle network is seen best in the Warren truss (Fig 11)

Supported like a beam, on but two supports exerting (for vertical loads) only vertical reactions, a truss has determinate reactions, computed as for a beam, it is a *simple truss* Its stresses under any particular loading are easily determined When there are more than two supports, or when the supports are such as to exert nonvertical reactions of variable direction, their calculation depends on the internal structure of the truss, either (1) upon the presence of a hinge in the truss (cantilever truss, three-hinged arch), or (2) when there is no hinge, upon the elastic properties of the truss (constrained truss, continuous truss, arch of less than three hinges, suspension framework) The latter case (*indeterminate support*) requires intricate computations However, so soon as the reactions have been computed, the stresses in the truss are readily determined, provided the truss has no unnecessary (super-numerary) members, i.e., provided no member can be removed without causing collapse Trusses with supernumerary members are *internally constrained frames*, they are used infrequently.

The action of the truss in carrying loads is exhibited in the three sketches of Fig 13 In I, a bottom-chord member is removed, the two

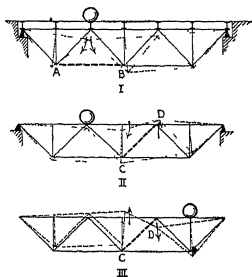


FIG 13.

parts of the truss are free to move downward, as the arrows indicate, causing A and B to separate Evidently the member AB must exert tension to hold the truss together In II and III the diagonal CD is removed, in the first case points C and D separate, in the second

they approach, showing that the diagonal CD (when in place) holds the truss rigid by exerting tension in the one case and compression in the other. Most web members of trusses are subject to the same condition as CD , viz., they must resist tension at one time and compression at another (stress reversal). Where such a member is a wooden strut whose ends butt against the other members at the joint and cannot receive tension, or where it is a thin iron tension rod incapable of resisting compression, the arrangement seen in the middle panels of the Pratt truss (Fig. 9) is used; an opposing diagonal is added to the panel, and one or the other diagonal is alone in action at any one time, depending on the position of the loads. The added diagonal is a *counter*. The Howe truss is usually built with counters in all panels (timber-strut diagonals), and then the vertical tie-rods can be tightened up initially, making all joints tight. The Pratt truss, with rod or eyebar diagonals, has counters in the panels near the middle only; the others experience no stress reversal, because the dead-load tension is great enough to overcome the live-load compression.

Analysis of Stresses. Truss stresses may be computed by composition and resolution of forces, as shown in elementary statics, so soon

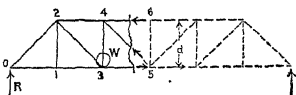


FIG. 14.

as the reactions have been computed. In Fig. 14 the reaction force R may be resolved in two directions parallel to the two members $0-1$ and $0-2$, and since the forces acting at the joint must form a balanced group the stresses in these two members will be equal to the computed components (but of opposite direction). Proceeding in this way for successive joints, all stresses may be obtained. This process is the basis of *graphical stress analysis*. This consists in drawing a force polygon and a string polygon (see GRAPHIC STATICS) to determine the reactions, and then drawing a *reciprocal* or *Maxwell* diagram, which is a continued application of the triangle of forces and thus is the graphical expression of the above-stated method of computation; the stresses are measured from the diagram.

Numerical stress analysis is done generally by the method of sections, based on the principle that, since any segment of the truss is in equilibrium, the stresses at its ends must balance the combined effect of loads and reactions on that segment. In Fig. 14 the stress in the top-chord member $4-6$ is obtained thus: Cut the truss by a section indicated by the irregular line, and at the cut faces of the members $4-6$, $4-5$, $3-5$, apply forces equal to the stresses which existed in those members; then the entire left-hand segment of the truss must be in equilibrium, all forces balancing. If panel point 5 be taken as fulcrum (centre of moments), the turning moment of the loads resting on the segment and of the reaction R is easily computed; and since the stress in $4-6$ exerts a balancing moment, it is found by dividing the moment by the lever arm d of stress $4-6$. Or, to find the stress in the diagonal $4-5$, cut the truss in

the same way and compute the net vertical force acting on the segment (equal to load W less reaction R); this is equal to the vertical component of the stress in $4-5$.

The cross-sectional area and strength of connections which a member must have are determined from the stress by simple division, knowing the stress per square inch which is permissible in such a member. At this stage the engineer must, by computation or judgment, allow for all accessory influences which may require greater strength in the member, e.g., vibration, tendency of compression members to buckle, etc.

The above principles of analysis, applied with much systematization of detail, are employed for all trusses. Trusses with multiple web system like the Whipple and the lattice are internally constrained; in practice approximative assumptions are made concerning the division of load between the several web systems, and thereafter the methods above outlined are used.

Influence Lines.—A diagram representing the variation of stress in a given member of a truss as a single load moves over the bridge is called the *influence line of stress* in that member. To draw such a line, the stress for each particular position of the load is to be laid off vertically below the load, from a horizontal base line. Influence lines are used in determining the position in which a specific group of wheel loads (e.g., a locomotive) will produce maximum stress in the particular member for which the influence line was drawn. These positions may also be derived by algebraic analysis.

Details of Truss Bridges. The steel truss depends essentially on riveted plate-and-shape assemblage. The larger part of bridge material is plates and angles, with channels next in importance. Bridge rivets are small steel pins, $\frac{3}{4}$ inch to 1 inch in diameter and 2-8 inches long as required by the thickness of the plates to be joined. The various plates have holes punched or drilled in them, matching when superimposed, to receive the rivets. The rivet has a head formed on one end beforehand; it is heated to bright heat, inserted in the hole, and then upset at the other end to form a second head. The plates are held tight between the two heads of the rivet and are drawn still tighter together as the rivet cools. *Pin connections* and eyebar tension members were universal in American practice until about 1890 and are still used in all bridges of great size, while English and European practice employ *riveted connections*. In pin-connected construction a joint is made by a steel "pin," 3-24 inches in diameter, which passes through all the members meeting at the joint, their ends being interleaved for the purpose. In erecting the bridge a pin joint is connected by simply driving in the pin, while a riveted connection, consisting of large side plates, *gussets*, which extend over the sides of all the members and are riveted to them, must be temporarily held by screwing in a large number of bolts and later riveted up permanently. Since trusses have in theory frictionless hinge joints, a pure hinge action was claimed for pin connections by American engineers in former years; but it is now known that the friction on pins nullifies their hinge action. Both riveted and pin joints interfere with free angular distortion of the truss network (which occurs as the load stresses slightly extend or compress the members) and

compel the members to bend slightly to suit the distortion. These bending stresses are *secondary stresses*, their calculation, practiced only during recent years, is now regarded as important in the design of all large bridges.

Rivets are never used for tensile, but always for shear-resisting action, holding plates against being pulled apart by slipping past each other. They are designed on the basis of their shearing strength and the bearing power of the edge of plate against which they bear. However, their real holding effect is in the friction between the plates due to the tight grip of the rivets.

Eyebars are wide bars forged at the ends to disk-like heads in the plane of the bar, through which holes are bored to fit the joint pins. They are highly reliable tension members, and their full sectional area is active without loss by rivet holes. Eyebars have been made as large as 16 inches by 2 inches and 50-70 feet long, capable of bearing 250 tons' tension, in a very large bridge the tension chord and main diagonals may have 8 to 12 such bars side by side.

Bracing of truss bridges is arranged as already described and is made nowadays of rigid plate-and-angle members, connected to the trusses with riveted joints.

A few long-span simple-truss bridges are listed below.

SOME LONG-SPAN SIMPLE-TRUSS BRIDGES

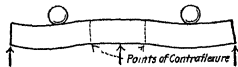
Name	Railway or Highway	Date	Span, ft
St. Louis Municipal	Ry	1913	668
Quebec, new, susp span	Ry		640
Bonn, Germany	Hy	1898	614
Düsseldorf, Germany	Ry	1899	595
Elizabethtown, Ohio	Hy	1903	586
Cologne, North	Ry	1912	550
Louisville	Ry	1894	546
Cincinnati	Ry	1889	542
Cologne, South	Ry	1912	541
Philadelphia	Ry	1896	533

CONTINUOUS AND CANTILEVER BRIDGES

Two successive spans of a bridge have greater strength if then girders or trusses are con-



I Two Simple-Span Girders



II Continuous Girder



III Cantilever Arrangement of Girders

FIG. 15

noted at top and bottom so as to become *continuous*, the bridge then has continuous girders or trusses (see I and II, Fig. 15). The action

of such a bridge is disturbed by lack of perfect adjustment in erection, and later by settlement of any support, and therefore the type is little used in bridge construction (swing bridges are a modified application). Stephenson's tubular bridges (see above) were continuous girder structures. The largest recent bridge of continuous type is the Fades Viaduct, France (1904-08), with three spans totaling 1228 feet, the middle one 472 feet long and 435 feet above the valley bottom.

In the continuous girder the *points of contraflexure*, or reverse bending shift slightly as the position of the load shifts. A hinge in the girder as at III fixes the location of the contraflexure, the structure then is a *cantilever bridge*, which has the economy of the continuous girder but avoids its disadvantages. The reactions of cantilever bridges are computed by use of the lever principle as with simple beams and trusses, and the stresses are then readily found, reactions and stresses do not depend on the make-up or the elastic properties of the bridge.

Besides economy the cantilever bridge has advantage in ease of erection when a span not containing a hinge has been erected, the hinge span can be built by adding on member after member, without using falsework, since in each successive stage the bridge is self-supporting. Cantilever construction has been used for the world's longest bridges, and only the suspension type is a near rival. A list of some large cantilever structures is given below.

LONG CANTILEVER BRIDGES

Name	Railway or Highway	Date	Span, ft
Quebec	Ry		1800
Forth	Ry	1890	1710
Blackwells I., New York	Hy	1908	1182
Sakur, India	Ry	1889	820
Wabash, Pittsburgh	Ry	1902	812
Memphis	Ry	1892	790
Beaver	Ry	1911	769
Mingo	Ry	1902	700

The famous Firth of Forth Bridge, designed by Baker, completed 1890, is the most remarkable of the group. It is unique among modern bridges in having its members made up of great tubes built of plate iron, instead of rectangular members riveted together of shapes and plates, and also in having all its parts built together out of the elementary plates in place.

Quebec Bridge and K-Truss. An 1800 foot cantilever across the St. Lawrence River near Quebec, was begun in 1903, and collapsed in 1907, when its south half was nearly completed. The failure is not chargeable to the cantilever principle, but was due to imperfections in details, the main compression chords of the anchor arm buckling under some 6000 tons compressive stress each. A new bridge of the same span, 1800 feet, was begun in 1911. Its design (Fig. 16) employs an unusual type of truss, the *K-truss*, which is a modified Pratt truss with the advantages of the Whipple truss in short panel length and ease of erection.

ARCH BRIDGES

A bridge which presses outward against its supports is an arch bridge. An arch is essentially a compression member, a curved strut

pressed together by the abutment reactions and held down by the loads on it. Under a particular fixed loading the curvature of the arch can be so adjusted to loads, span, and rise that the compression is central (axial) everywhere along the arch (*linear arch*), but for any other loading the compression is no longer axial, and the stresses then are the equivalent of an axial stress and a bending moment. Therefore, bridge loads being shifting, bridge arches must have considerable stiffness against bending. They are of either beam or truss construction: *solid-rib arches*, and braced arches or *arch frameworks*. The former are built of stone, concrete, steel; the latter always of steel.

The invention of the arch cannot be dated with certainty, the Romans probably having derived the arch from a prior race. While arch construction has been practiced continuously for over 2000 years, its science has been devel-

two-hinged arch, of simpler nature. An additional hinge at the crown converts this into a *three-hinged arch*, a type which is as easy to analyze as a simple truss or a cantilever bridge. Two beams set on end and brought together at the top form an elementary three-hinged arch. A fourth hinge destroys the stability of the structure.

Theory and Analysis.—When the reactions (thrusts) are known, the arch stresses can be analyzed by methods similar to those used for beams and trusses. This process is usually employed for arch framework. For solid-rib arches, however, a special form of graphical analysis is commonly employed. Drawing the load forces and the reactions to scale in their true locations, a string polygon is drawn, starting at one of the reactions; this polygon represents the *line of pressure* in the arch ring. The distance at any point from pressure line to mid-

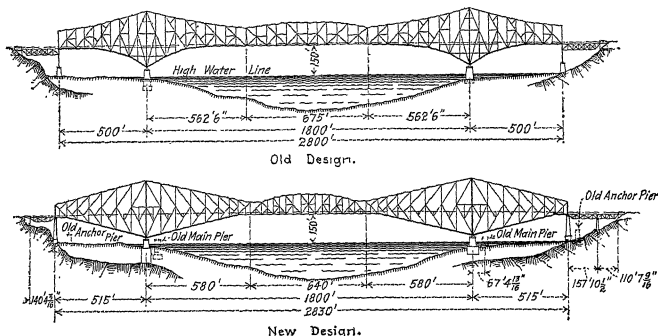


FIG. 16. OUTLINES OF OLD AND NEW QUEBEC BRIDGES, ST. LAWRENCE RIVER.
(The Old Bridge collapsed during erection, 1907.)

oped only within the past century and a half; but experience had taught efficient stone-arch construction before the science was worked out.

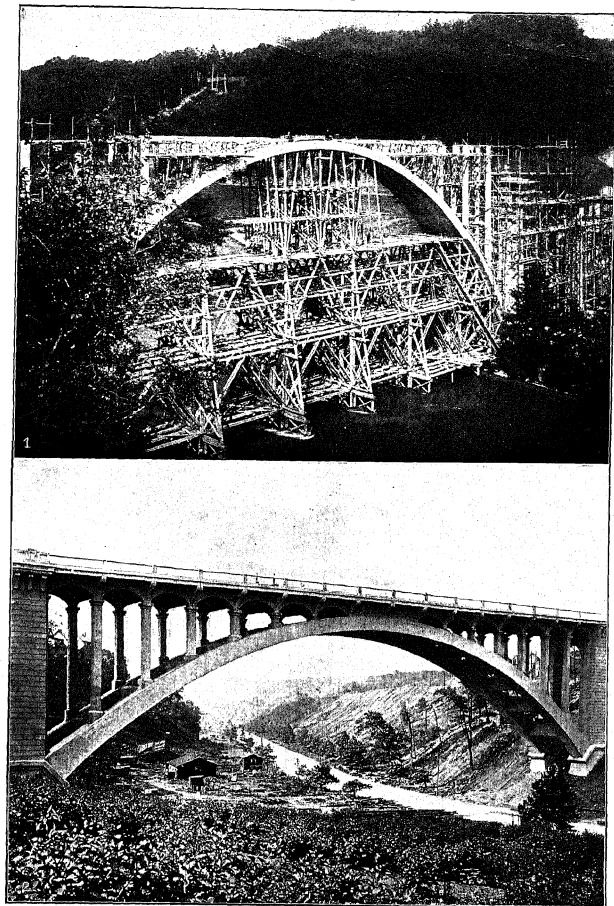
The arch in all forms consists of a barrel or *ring* (or *ribs*), bearing against skewback blocks of the abutments at its ends (the *springing lines*), and rising to the *crown* or *key*. The portions between skewbacks and crown are the *haunches*. The inner and outer faces of the ring are *intrados* or *soffit*, and *extrados*. The height from springing to crown is the *rise*; generally a flat arch (with low ratio of rise to span) is more difficult in construction than a high arch. Arches are named as to form: elliptical or basket-handle, semicircular (full-centred), segmental (circular, less than half a circle), parabolic, pointed (Gothic), three or five-centred (approximating elliptical form but made up of arcs of circles).

Types. Apart from differences in material and outline, arches differ in their nature with the number of hinges they contain. The ordinary stone or concrete arch has no hinges, but forms a continuous rib rigidly anchored to the abutments or bearing against them with broad end faces; it is the most complex type, the *fixed arch*. Hinges at the abutments make it a

depth of arch ring, multiplied by the amount of the arch pressure at that point (scaled off the force polygon), is the bending moment which acts in the arch at that point; computing (by the beam formulas) the stresses caused by this moment, and adding the compressive stress which the arch pressure would cause if central to the ring, gives the edge stresses in the arch.

The lever principle is sufficient for determining the reactions in three-hinged arches. With centre of moments at one abutment the opposite vertical reaction is obtained; with centre of moments at crown hinge the horizontal thrust is obtained. Two-hinged and fixed arches involve the flexibility of the arch, as follows: If the end supports be changed to vertical supports (eliminating the arch thrust), the arch spreads, by an amount depending on the position of loads and on the flexibility of the arch. The amount of spread can be computed; also the thrust which will reduce the spread by one inch can be computed; the number of inches spread multiplied by the thrust per inch gives the thrust which is exerted on the actual arch. This is sufficient for two-hinged arches, but an additional computation is needed for fixed arches. In the actual arch the part adjoining

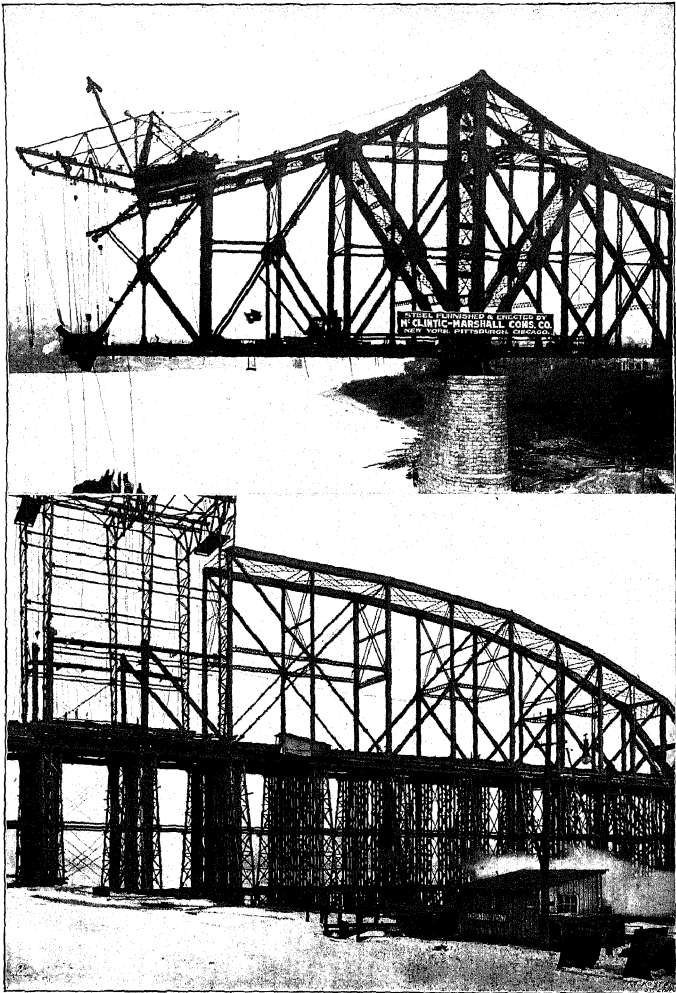
BRIDGES



ARCH BRIDGES

1. HALEN BRIDGE, BERN, WHILE REMOVING CENTERING
2. LARIMER AVENUE CONCRETE ARCH, PITTSBURGH, PA.

BRIDGES



BRIDGE ERECTION

1. ERECTING A CANTILEVER BRIDGE WITH TOP-CHORD TRAVELER.
BEAVER BRIDGE, OHIO RIVER
2. ERECTING A LONG TRUSS SPAN ACROSS THE MISSISSIPPI RIVER
AT ST. LOUIS, MO.

the skewback does not change its angular position. Regarding the arch as two-hinged, the change of angle at the skewback can be computed, for a given position of the loads, and also the end moment required to reduce the angular change one degree, this moment multiplied by the degrees of angular change for the two-hinged condition gives the actual end moment of the fixed arch.

For solid-rib arches the above considerations lead to three formulas by which the thrust and end moment are found

$$\int \frac{M ds}{I} = 0, \quad \int \frac{M x ds}{I} = 0, \quad \int \frac{M y ds}{I} = 0,$$

in which M = bending moment at any point of the arch, in terms of the loads and the unknown reaction, thrust and moment, I = moment of inertia of the cross section of the arch at that point, ds = element of arc length of the arch ring, x = horizontal distance of the point from one abutment, and y = vertical distance of the point above the plane of the skewbacks, the integration being extended from abutment to abutment in each case. For fixed arches all three formulas are used, for two-hinged arches, only the last two. The three equations express the following facts: angular change at abutment is zero, vertical displacement at abutment is zero, and horizontal displacement at abutment is zero. For arch frameworks the same reasoning but different resulting formulas are used, involving summation and the stresses in the members in place of integration and the ring moments. The *reciprocal theorem* serves for finding the deflections and is the basis of the formulas, the *principle of least work* is often employed instead.

Besides load effects, temperature effects must be calculated in two-hinged and fixed arches, as the end constraints interfere with free expansion (or contraction) and therefore stress the arch. In flat arches the temperature stresses are a large fraction of the total stresses.

Stone and concrete arches sometimes are fitted with hinges (two, rarely three), but in the vast majority of cases they have no hinges, hence are fixed arches and should be analyzed by the methods just referred to. In recent practice this is often done, the result being to locate the pressure line at the abutment, whence the string polygon continues it through the length of the arch. A simpler and satisfactory method, widely used, bases on the principle that the true pressure line is that one which departs least from mid-depth of the arch ring, various string polygons, starting at different points of the skewback, are drawn in such a way as to strike near the middle of the key of the arch, and the one which diverges least from the centre line of the ring is accepted as the true one. The principle is safe only for arches carrying solid spandrel walls, and may be applied only with great care to *free-rib* arches, where the roadway is supported on the ring by isolated columns. For arch analysis, consult Merriam and Jacoby, *Roofs and Bridges*, part III, Howe, *Symmetrical Masonry Arches*, and A. Treatise on Arches, Cain, *Graphical Arch Analysis*.

In designing an arch the distribution of dead load is first studied, and the curve of the centre line of the ring is made to correspond as nearly

as possible to the linear arch for the dead-load distribution. The intrados curve may depart from this shape to suit the desired aesthetic effect, but the ring thickness must be correspondingly increased. Then pressure lines or stresses are computed for various groupings of the live load. For both stone and concrete arches the governing principle is to keep the pressure line within the *middle third* of the ring thickness, as this assures that no tensile stresses occur (masonry is not suited for tension).

Metal Arches. The Coalbrookdale cast-iron arch of 1779 was followed in the nineteenth century by the construction of a large number of cast-iron arch bridges. These of London and Paris are the most notable. In their nature they are direct analogues of the stone arch, being formed of a ring of arch blocks. They are built on centring and are subject to the limitations of span length affecting the masonry arch. Cast-iron arches exceeding 200 feet in span have been built, and proposals have been made for very much larger ones. However, the two greatest cast-metal arch bridges are of cast steel—the Eads Bridge over the Mississippi (1874), of 520-foot span, and the remarkably flat three-hinged Alexander III. Bridge over the Seine in Paris, with a single span of 353 feet and a rise of but 20.6 feet. Wrought-metal arch construction outdistanced cast construction, however, as may be seen from the table below, giving steel

STEEL ARCH BRIDGES OVER 500-FOOT SPAN

Name	Railway or Highway	Date	Span
Hell Gate	Ry		1000
Niagara, Upper	Ry	1898	840
Vlaar, France	Ry	1902	721
Douro (Lux 1)	Ry	1893	666
Muangsten	Ry	1897	558
Niagara, Lower	Ry	1897	550
Garabit	Ry	1885	541
Bellevue Falls	Ry	1905	540
Levensau	Ry	1894	536
Douro (Pia Maria)	Ry	1878	525
Eads	Ry	1874	523
Greenenthal	Ry	1892	514
Washington (N. Y.)	Ry	1889	509
Zambesi, Africa	Ry	1905	500

arches over 500 feet in span. They are of two essentially different forms—rib arches (e.g., Eads and Washington), and arch frameworks. The former are built with plate-girder ribs, the latter of chord-and-web arrangement like that of trusses but of different outline. The two Niagara arches exemplify two important arrangements of arch frameworks. The lower arch, 550 feet in span, has a parabola lower chord and a horizontal upper chord, the upper arch has parallel chords, both being curved. The famous Garabit arch in France (1885) has crescent-shaped framework.

The main spans of the great arch-shaped Rhine bridges at Dusseldorf, Bonn, and Cologne are not arch but truss bridges, having a tension chord and exerting no thrust against the abutments. They are listed above with simple-truss bridges.

Stone and Concrete Arches. The stone arch has much historical importance, but to-day it is used infrequently for bridges. Works on the history of bridges (e.g., Tyrrell, *History of Bridge Engineering*) may be consulted for descriptions of old stone arches. The greatest constructive feat in stone arch building was the

bridge over the Adda at Trezzo, Italy, about 250 feet in span, built 1380, destroyed 36 years later. A 295-foot arch at Plauten, Germany (1903), is the longest ever built. Some others are noted below:

SOME NOTABLE STONE ARCH BRIDGES

	Span, ft.
Plauten, Germany	295.3
Salcano, Austria	278.9
Luxemburg	277.7
Montagnes, France	262.8
Trezzo, Italy (1380)	250
Morbegno, Italy	250
Constantine, Algiers	230
Cabin John, Md (1859)	220
London Bridge (1830)	152
Pont-y-Prydd, Wales (1755)	140
Grenoble, France (1611)	160

Concrete has been used for arch construction since about 1890; at first stone arch types were followed, but in the early nineties steel-reinforcement was applied, permitting bolder design, and since then the concrete arch has become essentially differentiated. The arch ring is divided into two or more narrow ribs some distance apart laterally, braced together by struts, and columns resting on these ribs carry a floor of reinforced-concrete girders and floor slab. In such bridges the unit stresses cited under *Materials* are the basis of design, and with accurate analysis of the elastic deformations of the bridge very economical design is achieved. Concrete arches have been built as large as 328-foot span; some large-span arches are listed below. None of these are hinged. The largest hinged concrete arch is at Gruenwald, Germany, 230-foot span (1904).

Use of the Arch.—An arch may be considered as derived from the truss by combining the functions of compression chord and web and omitting the tension chord. The latter item is an economy unless very expensive abutments outweigh the saving of tension member. The

LARGE CONCRETE ARCHES

	Span, ft.
Rome, Italy	328
Auckland, N. Z.	320
Langwies, Switzerland	315
Larimer Ave., Pittsburgh	300
Halen, Bern	286
Monroe St., Spokane	281
Rocky River, Cleveland	280
Tufen, Switzerland	259
Walnut Lane, Philadelphia	232

arch, therefore, is best adapted to a rock-gorge location, or wherever the arch thrust is easily transferred to solid foundation strata. Also the elevation of roadway above valley must be high enough to admit the rise of the arch, flat arches being the most costly.

Building a stone or concrete arch bridge is done by first erecting a temporary supporting scaffold, of wood or steel (centring), with a board floor in the line of the arch intrados, and laying up the stone or molding the concrete on this floor. The centring is later lowered (struck), using wedges, sand-boxes, or jacks; the design of centring is a special problem. The centring distorts slightly under load, and precautions are used to avoid cracking the new masonry.

SUSPENSION BRIDGES

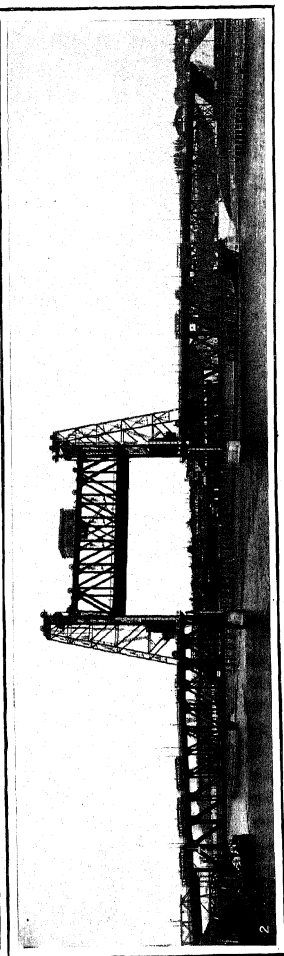
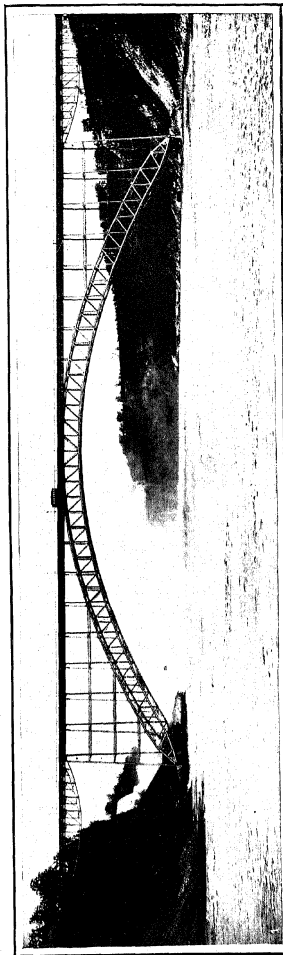
Following the pioneer chain suspension bridges of Finley in America (e.g., Greensburg, Pa., 1801), probably the first with floor hung from the cable, many suspension bridges

were built in Europe and America, wire ropes as well as chains being used. A chain suspension bridge of 676-foot span over the Thames at London (1845) and a wire-cable bridge of 1010-foot span over the Ohio at Wheeling, W. Va. (Ellet), were the greatest. Roebling built the first suspension bridge with *stiffening trusses* over the Niagara River in 1855 (825 feet), using many parallel wires assembled into large circular cables as the carrying members, and in 1863 built a 1057-foot bridge over the Ohio at Cincinnati. Keefer built the noted 1260-foot Clifton Bridge over the Niagara River in 1868. The building of the Brooklyn Bridge over the East River at New York (1869-83), with a span of 1595½ feet, carried by four 15½-inch parallel-wire cables, gave the suspension bridge great fame; this was the longest bridge span of its time. Two equally great suspension bridges were built near the Brooklyn Bridge 26 years later, the Williamsburgh and Manhattan bridges (1800 feet and 1470 feet); they represent important constructional improvements over the Brooklyn Bridge, yet the latter has been in constant service 30 years and with minor reinforcement is carrying safely a traffic much heavier than originally intended. All three bridges have parallel-wire cables—the type which gives greatest strength per pound. Eyebar-chain suspension bridges have also found important application, as notably at Budapest (1905), with 951-foot span, and at Cologne, where a chain bridge with plate-girder stiffening member was begun in 1913.

The action of a suspension bridge is that of a rope spanning between supports: for any loading it finds the appropriate curve of equilibrium and is stable in that position. But as the adjustment to varying position of load results from change of curve, the roadway hung from the cable also distorts, i.e., the bridge is very flexible. Longitudinal stiffening trusses are therefore used, their stiffness preventing any but slight distortion under localized loading. The stiffened suspension bridge is analogous to the Burr arch-and-truss combination, the cables (the arch) carrying uniform load, while the trusses take care of inequalities in loading. The numerical analysis of this action is intricate, however, depending on calculations of relative deflections. Various arrangements of the truss-stiffening system (with hinges at various points, without hinges, supported at foot of main tower, free of tower, etc.) are employed, which further complicate the design problem. Temperature expansion is another complication, altering the relations between cable and truss. The structure is made somewhat simpler by building the stiffening truss directly along the suspension chain, the latter forming part of the truss; such a bridge is an inverted arch and is analyzed by arch methods. Large bridges have not been built of this system hitherto, as wire cables have been preferred to eyebar chains, and the difficulty of attaching the inverted-arch trussing to cables leads to use of ordinary stiffening trusses.

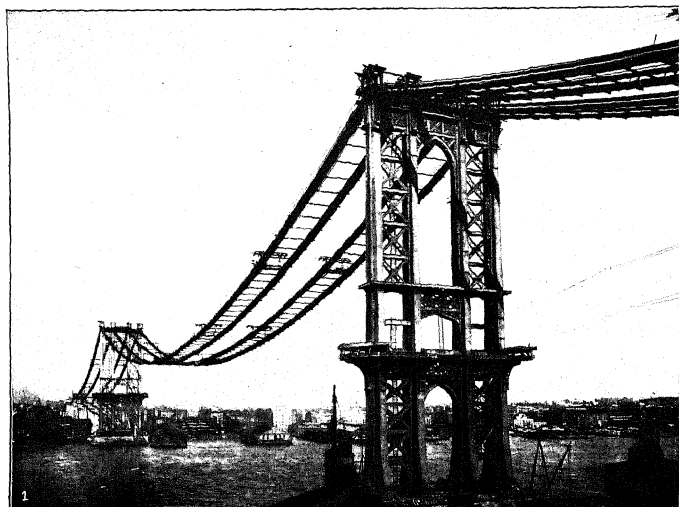
Three essentially different types of suspension bridge are represented by the three East River bridges. Some of the differences are: the Brooklyn Bridge has stone towers, suspension carrying the roadway in both main and shore spans, shallow stiffening trusses, and auxiliary hanger cables sloping down from the tower tops to the roadway and carrying an indefinite

BRIDGES



1. STEEL ARCH BRIDGE ACROSS THE NIAGARA RIVER
2. A MODERN LIFT BRIDGE, PORTLAND, OREGON

BRIDGES



THE MANHATTAN SUSPENSION BRIDGE

1. SPINNING THE CABLES
2. THE COMPLETED STRUCTURE

part of the roadway load. The Williamsburgh Bridge has open-frame steel towers (built of posts and bracing), suspension cable loaded in main span only (the shore spans of the cables acting merely as backstays), deep and rigid stiffening trusses, and no auxiliary hangers. The Manhattan Bridge has solid plate-construction steel towers, roadway hung from the cables in both main and shore spans, deep stiffening trusses, and no auxiliary hangers. The two former have expansion roller bearings under the cable saddles on top of the towers, while the Manhattan Bridge has its saddles rigidly fixed to the towers, the towers being so high that they are able to bend slightly (and yet support their enormous compressive load) as the cables shift longitudinally under temperature and load changes.

Suspension bridges are few in number compared with tuss and arch bridges. Their special fields are very long spans (particularly for highway bridges, which do not have the intense localization of loading to which railway bridges are subject), and moderate spans of very light character, as footbridges.

MOVABLE BRIDGES

The movable bridge or drawbridge, which can open to pass ships and close to carry its own traffic, finds its prototype in the castle-moat drawbridge. On rivers with much shipping drawbridges must be highly efficient, i.e., open and close quickly, to offer minimum interruption to both river and bridge traffic. Much inventive ingenuity has been spent on drawbridges, many types of movable bridge are in use and many more have been invented. The three prevailing types will be described briefly, others have found only rare or exceptional application.

Swing Bridges are truss or plate-girder bridges resting on a central pivot or turntable and fitted with hand winch or power drive geared to a circular rack surrounding the pivot, by which the bridge can be swung in a horizontal circle. The pivot is sometimes near one end, giving only one channel (bobtail draw), the short end being counterweighted so that the bridge balances on the turntable. Ordinary central drawspans afford two equal channel openings. By far the most drawbridges are of the swing type (until about 1890 almost none others existed).

The structure of a drawbridge is designed and built like that of other bridges, but the girders or trusses must be adequate for two different conditions of support: (1) when swung away from the end supports, the bridge being a simple cantilever beam on a single central support, and (2) when resting on the end supports, being then a continuous girder on three supports (sometimes four, if the two edges of the turntable afford sufficiently rigid support to be counted as separate supports). The end bearings must, however, be at a height corresponding to the unstrained outline of the bridge, i.e., higher than the ends of the bridge when swinging, as the ends then sag down. This requires *end-lifting machinery*, consisting of wedge blocks or toggle members (rarely lifting jacks) between the shoes and the ends of the bridge, operated from the machinery at the turntable. The turntable may be *centre-bearing*, i.e., consisting of a pivot only, or of a pivot with a few balancing wheels arranged in a ring around it,

or *rim-bearing*, i.e., consisting of a large ring of wheels which carry the whole load. The variations in turntable and end-lift construction are numerous.

Swing bridges exceeding 500 feet in span have been built, providing channel openings up to 200 feet. Long spans are rare, however. The fact that the pivot pier of a swing bridge occupies the middle of the passage, the most valuable part for navigation, is a strong objection to the swing bridge, yet sometimes the advantage of affording two separated channels (for up and down ship movements respectively) is decisive in favor of the swing bridge.

Bascule Bridges are similar to the medieval lifting drawbridges, being spans pivoted on horizontal trunnions at the ends, or of equivalent arrangement. On account of the great weight of a bridge span their operation would be impracticable were they not counterweighted in such manner as to balance on the trunnions. The balance must be maintained in all positions of the bridge, which offers certain difficulties. The means by which balancing is attained determine the differences between the several types of bascule in use. The *simple bascule* projects back of the pivot, and the tail carries the counterweight below its floor, tail and counterweight swing down in a tail pit as the bridge is swung up. Gearing arranged in the tail pit is the usual means of operation. With use of parallel-motion linkage the counterweight can be placed above the roadway, and the tail pit thus eliminated, this construction, in various modifications, is used in the Strauss and Rall bascules, though the latter in place of trunnions has for each truss a small wheel as support for the bridge, the wheel rolling back as the wheel rolls on its upper surface. In the Scherzer or *rolling-lift bascule* (see view) the entire rear end of the truss itself forms a large half-wheel, which rolls on a horizontal track just back of the abutment, the centre of this wheel is the virtual trunnion, and as this point is high above the bridge floor the counterweight is above the roadway.

Bascules are single-leaf or double-leaf, the latter consisting of two single leaves trunnioned on the opposite banks and with the free or lifting ends butting at midstream when the bridge is closed. A strong *latch* must be fitted at the abutting ends to lock the two leaves together so that their deflections under load will be in unison. Single-leaf bascules are also latched at the lifting end, to prevent vertical oscillation or *hammering* under the vibratory impact of traffic. A bascule acts as a cantilever under dead load, being balanced on the trunnions, but under live load a single-leaf bascule is a simple span on two supports. Bascules have been built with length of leaf over 200 feet, openings larger than 150 feet are needed but rarely.

Direct Lift Bridges represent an old type, recently revived. The construction is simple. The ends of the lift span are hung to cables passing up over sheaves on the tops of towers, with counterweights on the ends of the cables (inside the towers) balancing the whole weight of the bridge. Lifting cables passing over other sheaves on the towers and pulled by winch machinery located in the tower or on the lift span serve for moving the bridge up or down. An advantage of this type of bridge is that the span need not be "opened" to its full extent in each operation as must a swing bridge,

but for a vessel of low height need be raised only part way, thus giving quicker operation.

MISCELLANEOUS BRIDGES

Pontoon Bridges. Bridges of boats have been used at various times for 2500 years, and some are in use to-day (Rhine at Coblenz; Golden Horn at Constantinople). Their advantage is the elimination of foundations and piers in the river. Such a bridge comprises a close succession of barges or *pontoons*, ropes and anchors to hold the pontoons in place, and beams or truss spans from pontoon to pontoon carrying the roadway. If heavy load concentrations have to be carried, the successive spans must be interlinked and so designed that the passage of the loads over the bridge will not produce an excessive wave motion of the structure. Modern pontoon bridges are built with steel pontoons and trusses. Usually a draw span is included, consisting of a pontoon-supported section which is either hinged at one corner to the fixed portion and at the other end can be swung out of line of the bridge, or else is completely free, like a boat, except when latched in place between the ends of the fixed portions; the draw may be operated by rope, by the current of the stream, by screw propeller, by a tow vessel, etc.

Ferry Bridges. A ferryboat hung above the water from a bridge spanning the stream at a high elevation (so that ships can pass underneath) makes up the modern type of structure called ferry bridge or transporter bridge. Only a few have been built. In most of them the bridging span is of the suspension type; a ferry bridge at Duluth, however, has a simple truss span of normal character supported on high steel-braced towers at its ends. A track hung under the bridge carries wheels (or a truck) from which the ferry platform or car is suspended either by ropes or by a stiff frame. The truck running on the bridge track is moved by pull ropes or by gearing, thereby moving the ferry car across the river. The first such bridge was built by Arnodin in 1892 at Bilbao, Spain (span, 525 feet). The longest is at Widnes, England, of 907-foot span, built in 1905. In the same year the truss structure at Duluth was built, of 394-foot span; except this latter, all ferry bridges are supported by suspension cables.

Composite Bridges. This article has described distinct types of structure, but these are sometimes used in combinations of two types, composite bridges. Except for special conditions such composite bridges offer no advantage, and they are not only uncertain in their stress analysis, but are subject to change of internal conditions later, whereby greater load may be thrown on one element of the combination and the bridge thus become less safe.

BRIDGE ERECTION

Only the smallest bridges can be set in place entire. Large steel bridges are built together of sections or pieces previously constructed (built, fabricated) in a bridge builder's shop. Stone and concrete bridges are laid up or molded in final position out of their elementary parts. The construction in final place is called *erection*. In most cases it involves the use of temporary supports in the stream or valley crossed, called *falsework* or (for arches) *contring*. The

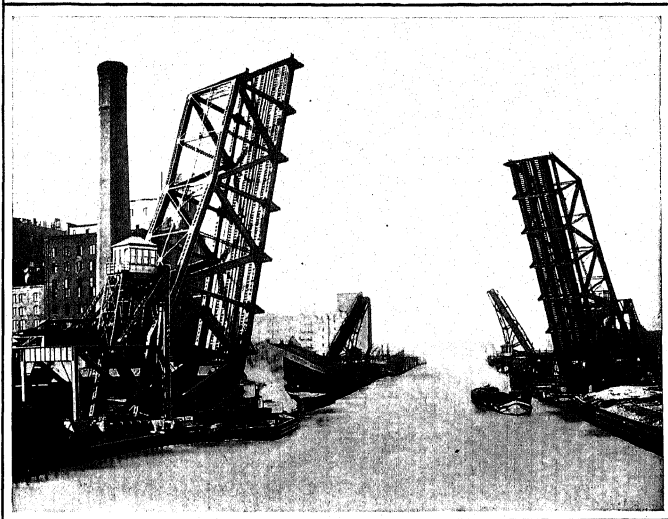
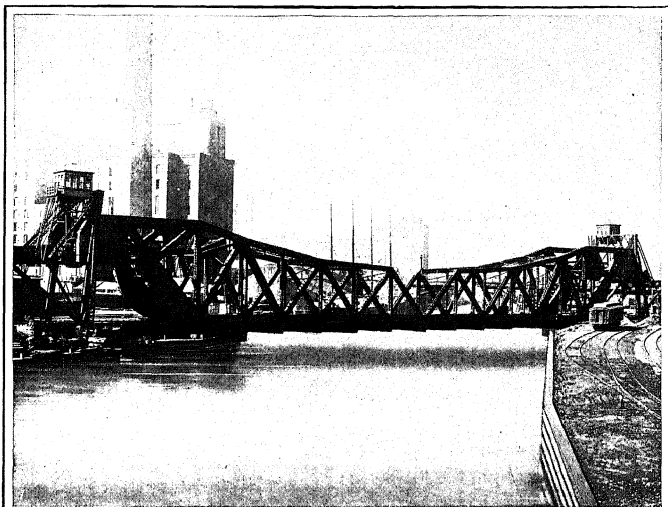
detail operations differ, depending on the location and nature of the bridge.

Steel Bridges. Derrick cars or gantry crane-frames (*travelers*) are used for lifting and setting the parts. Where possible, plate-girder spans are built together complete at the shop, with bracing and floor, and the entire span is set in place by a derrick or crane which lifts it off the railway cars and sets it down on its piers. High plate-girder viaducts have each span erected in similar manner, but before setting a span the derrick must erect the tower ahead, nearly always by hoisting its individual members and setting them in place one by one, from the bottom up, the derrick must therefore have a long overhang. Simple-span truss bridges are usually erected on falsework, but occasionally by floating in, the span being built together on falsework along the river bank, or by cantilever erection (span anchored back to be self-supporting as a cantilever temporarily). The cantilever method is always used for cantilever bridges and often for arch bridges; for the former, one span (an *anchor span*) must first be erected on falsework like a simple span, the cantilever span then being built out without falsework; for arch spans temporary backstays must be provided to prevent tipping forward.

In erecting steel bridges the connections of members are made by driving pins or by bolting up (and later riveting) the connection gussets, as already mentioned under *Trusses*. The final step is to lower the falsework support, letting the bridge come to bearing; this is usually done by knocking out wedges previously placed in the falsework. Riveting was formerly done with hand hammers. Pneumatic hammers are now used almost exclusively; steel-bridge erection has been considerably facilitated by their introduction.

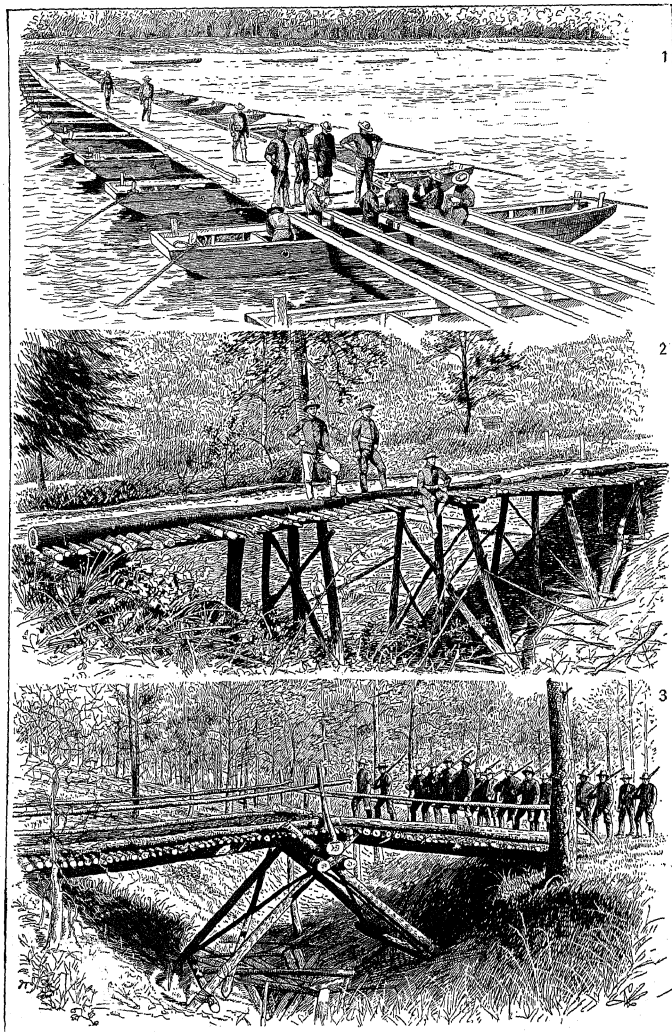
In simple or non-constrained spans the erection requires no adjustment of length of members, except that counter-diagonals fitted with turnbuckles must be tightened up to a bearing. Cantilever erection requires provision by jacks or wedges to lift the halves of the bridge before closure, by an amount corresponding to the sag, which during erection is different from that occurring in completed condition. Arches (except three-hinged) and all other constrained structures must have their closing sections fitted into place in such a way that the amount of constraint actually secured is the same as that on which the calculations were based. Thus, a two-hinged arch framework may be connected at the crown in the bottom chord without special precaution if the top chord is still open, but the subsequent closure of the top chord requires mean atmospheric temperature (that for which the arch was calculated as unstrained) and such load on the bridge as would according to the calculations result in zero stress in the closing member. This offers some difficulties: occasionally hydraulic jacks have been used to strain the bridge to the precise degree appropriate to the momentary load and temperature conditions. A common expedient in recent years for two-hinged arches is to make the closure by simple insertion at mean temperature, i.e., with zero stress in the closing member, and correspondingly to calculate the arch as though it were a three-hinged arch for the dead load and a two-hinged arch for live loads. Similar erection difficulties arising in other constrained bridges are dealt with by related methods.

BRIDGES



SCHERZER ROLLING LIFT (Bascule) BRIDGE, over Chicago River; open and closed.

MILITARY BRIDGES



1. PONTON BRIDGE.

3. SPAR BRIDGE.

2. SPAR TRESTLE BRIDGE.

Suspension-bridge erection varies with size of span and type. Small bridges usually have twisted-rope cables, which can be carried across, anchored at the ends, and laid on the towers without difficulty. Parallel-wire cables as used for the New York suspension bridges are built by the slow process of drawing wire after wire (each about $\frac{1}{4}$ inch in diameter) across from tower to tower and down to the anchorages, adjusting the position of each wire to the intended sag of cable, and, when all wires are in place, squeezing the mass of wires into circular form and binding it with a close covering of wire wrapping laid on spirally. A temporary suspension footbridge is first built by hauling ropes across the river, and on this footbridge the "cable-spinning" work proceeds. When the cables are finished, the hanger ropes are clamped to them, and last the floor members are hitched to the lower ends of the hangers, working out gradually from towers to midstream. Building the stiffening trusses is simple, as the floor affords a platform for this work, the trusses are not riveted up until completely reached, and until the proper temperature is reached, to avoid initial stress or constraint.

Stone and Concrete Arches. The centring for a large stone or concrete arch is itself of great magnitude and supports very heavy loads. Its design and construction must guard particularly against settlement, as the partly built masonry or concrete is injured by cracking if the centring settles or deflects before the arch is complete. For the same reason the load of the arch must be brought on the structure uniformly, so far as possible, to secure uniform deflection under load. To this end some stone arches have been built by laying up first a thin ring, the inner part of the arch, then another ring, etc. Usually, however, the arch is divided into numerous sections or arch blocks, and alternate blocks are constructed, thus producing uniform loading before any long portions of the ring are made continuous, the intermediate blocks are last laid up.

The design of bridges must consider the possibilities and economical methods of erection at all stages. Broadly a bridge design is determined as much by regard to erection as by any other consideration. Thus, where a stream or valley is so deep, or current or ice conditions so bad, that falsework cannot be used, a type of bridge must be chosen that permits erection without falsework, and generally, a bridge design of lighter weight may be inferior to a heavier one that is easier and cheaper to erect.

Renewal of Bridges. Bridge replacement is largely an erection problem. When a bridge must be replaced by a stronger or better one, the traffic often may not be interrupted, particularly on railways. The construction of the new bridge must be worked out with primary regard to the possibility of erecting it around, in, or alongside the old bridge without interfering with traffic, and so that at the end the traffic can be shifted from old to new bridge with no sensible interruption. On this account a bridge that has become too weak for the traffic (by increase of traffic load, introduction of street cars, etc.) is often reinforced, by addition of new trusses or by other means, though such work may be more costly and less satisfactory in result than the construction of a new bridge. The replacement of the Kentucky River Viaduct, the first cantilever bridge, in 1911 (consult *En-*

gineering News, vol. lxxv, p. 518), is a good example of replacement under traffic, and the reinforcement of the Point Bridge, Pittsburgh, in 1905 (*Engineering News*, vol. lxxi, p. 85), an example of repair and reinforcement.

Bibliography. The literature on bridge building is quite extensive and is widely scattered, much of the most valuable descriptive matter being found in the periodical literature of the engineering profession. Among engineering papers are *Le génie civil* (Paris, 1880, current), *Zeitschrift des Vereins deutscher Ingenieure* (Berlin, 1857, current), *Engineering* (London, 1866, weekly, current), *Engineering News* (New York, current), and the *Engineering Record* (New York, current). *The Proceedings of the Institution of Civil Engineers* (London, 1838, current), *Annales des ponts et Chaussées* (Paris, 1831, current), and *Transactions American Society of Civil Engineers* (New York, 1868, current), also contain much important information relating to bridges. Among the more recent textbooks and books of reference are Johnson, *Practice of Modern Framed Structures* (New York, 1900), Meriman and Jacoby, *Roofs and Bridges* (New York, 1900), Waddell, *De Pontibus* (New York, 1898), I. Hroi, *The Statistically Indeterminate Stresses in Frames Commonly Used for Bridges* (New York, 1905), F. C. Kuntz, *Design of Steel Bridges* (New York, 1914), W. Cain, *Theory of Solid and Braced Arches and Theory of Steel Concrete Arches* (New York).

BRIDGE. A game of cards similar to whist and formerly called bridge whist. It is played with a full pack of 52 cards and is a game for four persons. The game is 30 points. These points are made by attaching a certain value to each trick over six, according to the suit which has been declared as trump. Spades are worth 2 points, clubs, 4 points, diamonds, 6 points, hearts, 8 points, no trumps, 12 points. Besides the score for tricks there is a separate score for honors. Honors are the five top cards (A, K, Q, J, 10) of the trump suit, at a declared trump, or the four aces at no trump. The score for three honors between partners is worth twice the value of the suit declared, 4 honors, 4 times, 5 honors, 5 times, 4 honors in one hand, 8 times, 4 honors in one hand, 5th in partner's, 9 times, 5 honors in one hand, 10 times. At no trump 3 aces between partners count 30 points, 4 aces 40 points, 4 aces in one hand, 100 points. Chicane (holding no trumps) counts the same as three honors. Grand slam (taking all of the 13 tricks) counts 40 points, little slam (taking all but one trick) counts 20 points. The rubber is the best of three games, and if the first two games are won by the same partners, the third is not played. The winner of the rubber receives 100 points in the honor column.

Partners sit opposite each other, and their positions at the table are known as dealer and dummy, eldest hand and pone. The cards are shuffled and dealt as in whist, except that no trump card is turned. After examining his cards the dealer may declare any suit for trump that his hand warrants, or he may play the hand without a trump. As there is a great difference in the value of the declarations the dealer may make, he also has the privilege of bridging, or passing, the make to his partner. If this is done, his partner must make a declaration. After the trump has been settled,

the adversaries cannot change it, although they may increase the value of the points to be played for by doubling, in which case the dealer or his partner may redouble, and so on until both sides are satisfied. When the doubling, if any, is finished, the eldest hand may lead any card in his hand he pleases for the first trick. As soon as this card is placed, the dealer's partner must lay down in front of him on the table his 13 cards, face upward and sorted into suits. From that time on he becomes dummy, the dealer playing the exposed hand and his own without help or comment from the dummy. The dummy may call the dealer's attention to a revoke or to an incomplete trick. Consult: Foster, *Complete Bridge* (New York, 1908); Elwell, *Practical Bridge* (New York, 1908); Dalton, *Complete Bridge* (New York, 1906); Hingley, *Hints on Advanced Bridge* (London, 1910); Forbes-Lindsay, *Blue Book of Bridge and Auction for Beginner and Expert* (Philadelphia, 1911). See AUCTION BRIDGE.

BRIDGE, NATURAL. See NATURAL BRIDGE.

BRIDGE, OF A SHIP. A platform raised some distance above the deck of a vessel for the convenience of the officer having charge of the deck. In merchant vessels there is usually one bridge extending the full width of the ship; in some very large steamers there are two of this character. In men-of-war the bridges are reduced to the least possible limits in order to decrease the amount of *débris* which might accumulate in action about the conning tower. When a bridge expands into a platform of considerable area, instead of being merely a narrow promenade, it is commonly called a *bridge deck*. On some vessels there are as many as two bridge decks, one above the other, with the bridge or bridges above both. On or under these bridge decks the pilot house, chart house, and captain's cabin are usually placed.

BRIDGE, SIR FREDERICK (1844-). An English organist and composer, born at Oldbury (Worcestershire). He studied under John Hopkins and Sir John Goss, in 1865 was appointed organist of Trinity Church, Windsor, and in 1869 of Manchester Cathedral. From 1875 to 1882 he was deputy organist of Westminster Abbey, of which he was in the latter year appointed organist. He became successively professor of harmony in Owens College (Manchester), professor of harmony and counterpoint at the Royal College of Music, and in 1902 King Edward professor of music at London University. His works include: *Mount Moriah* (1874), an oratorio; two cantatas, *Bodicea* (1880) and *Callirhoc* (1888); a setting of Gladstone's Latin version of Tiplady's "Rock of Ages," *Lover of Music* (1904), and many anthems, including one for the celebration of the Queen's jubilee at Westminster Abbey (1887).

BRIDGE, HORATIO (1806-93). An American naval officer, born at Augusta, Me. He graduated at Bowdoin College in 1825, was admitted to the bar, and in 1836 was appointed paymaster in the United States navy. From that time until 1861 he cruised about, making several visits to Africa, which he describes in the *Journal of an African Cruiser* (1845). He was then made chief of the Bureau of Provisions and Clothing. Upon his resignation in 1869 he was appointed chief inspector in the same department and finally retired with the rank of commodore. He also wrote *Personal Recollections of Nathaniel Hawthorne* (1893).

BRIDGE, JOSEPH COX (1853-). An English organist and composer. He was born at Rochester, Kent, studied under John Hopkins, and from 1871 to 1876 was organist of Exeter College, Oxford. In 1877 he became organist of Chester Cathedral. In 1879 he revived the triennial Chester Music Festivals, which had been abandoned in 1864. His works include an oratorio, *Daniel* (1885); a *Magnificat* and *Nunc Dimittis*, in C, for voice and orchestra (1879); a *Symphony in F* (1894).

BRIDGE-BUILDING BROTHERHOOD (Lat. *Fratres Pontifices*). A religious fraternity formed in the south of France in the latter half of the twelfth century, to build bridges and keep ferries. As the Church considered such labors meritorious, the societies spread and grew rich. According to tradition, the shepherd boy, Bénézet, received a revelation that he must build a bridge across the Rhône at Avignon. Accordingly he went to the bishop and told his story, but was repulsed. The provost, however, aided him, and work was begun in 1177. The bridge was not completed until 1185, and Bénézet, dying in the meantime, was buried in the chapel in one of the columns of the bridge. He was afterward canonized. Either the fame of St. Bénézet, or compassion for persons who were forced to pay large tolls, led to the founding of a brotherhood for the purpose of carrying on the work of bridge building, and in 1189 Clement III sanctioned the order. Similar brotherhoods were formed in other parts of France and in the north of Italy. They labored very hard for a time, but soon the possession of wealth led to idleness. In 1277 the Brotherhood of Bonpas wished to unite with the Templars, but instead Nicholas III united the order with the Knights of St. John (1278). Other brotherhoods were active for nearly three centuries until the dissolution of the order by Pius II. Consult Grégoire, *Recherches historiques sur les congrégations hospitalières des frères pontifes* (Paris, 1818).

BRIDGEHEAD, or (in French) TÊTE-DU-POINT. In military engineering, a fortified work intended to defend the passage of a river over a bridge. See TÊTE-DU-POINT.

BRIDGEND, brî'end'. An industrial market town of Glamorganshire, Wales, 14½ miles southeast of Neath (Map: England and Wales, C 5). It is a junction of the Great Western Railway and lies on both sides of the river Ogwr. In the town are ruins of a Norman castle. In the neighborhood are the interesting remains of Ogmores Castle, of Coity Castle, and the castellated ruins of Ewenny Priory, founded in 1146. Blast furnaces constitute the chief industry. Pop., 1891, 4076; 1901, 6290; 1911, 8021.

BRIDGE OF SIGHS, THE. 1. A lofty bridge in Venice, built by Antonio Contino about 1595-1605. It spans the Rio della Paglia, connecting the Doge's Palace with the Carceri Prigioni. Its name was derived from the fact of its leading to the prisons. It is inclosed at the sides, arched overhead, and contains two separate passages. Byron mentions it in the opening lines of *Childe Harold*, Canto IV. 2. A poem by Thomas Hood (1844), on the recovery of the body of a London outcast, who had drowned herself in the Thames. 3. The name is also used of a bridge connecting the Tombs prison in New York with the court rooms.

BRIDGE/PORT. A city, port of entry, and

one of the county seats of Fairfield Co, Conn, on Bridgeport harbor, an arm of Long Island Sound, at the mouth of the Pequonnock River, 18 miles southwest of New Haven, 56 miles northeast of New York (Map Connecticut, C 5) It has railroad connections by the New York, New Haven, and Hartford and its branches, and steamboats run daily to New York The city is built mainly on level ground and occupies an area of about 15 square miles Black Rock, which forms part of Bridgeport, is a summer resort, its harbor being a popular anchorage ground for yachts The most notable buildings are the United States post office and customhouse, the county courthouse, the Barnum Memorial Institute, the Burroughs Public Library, the Sterling Widows' Home, the Burroughs Home for Aged Women, the Protestant Orphan Asylum, St Vincent's Hospital, the city hospital, a new high school, and the Young Men's Christian Association Building Bridgeport is the headquarters of the Barnum and Bailey circus, which occupies extensive grounds in the city proper There are three fine parks, comprising about 250 acres Seaside Park is situated on the sound It has a long and beautiful drive on the sea wall and contains a soldiers' monument and statues of Elias Howe and P T Barnum A fine statue of James P. Beardsley has been erected in Beardsley Park

Bridgeport is an important manufacturing city and has considerable coasting trade, the harbor being safe and accessible for fairly large vessels The principal articles manufactured are sewing machines, corsets, coaches, locomobiles, plush goods, brass, iron, and steel tubing, machinery, cartridges and shells, ordnance, graphophones, compressed-gas capsules, hats, taps and dies, and hardware Some of the factories are of vast size The Union Metallic Cartridge Co has an ammunition park of 425 acres here

The city government is vested in a mayor, elected every two years, a municipal council, and the usual administrative departments, all appointed by the executive, and all, excepting that of public works, where the power is given to a single head, governed by boards The school board, consisting of 12 members, four elected each year for a term of three years, is chosen by popular election The annual expenditures of the city amount to about \$1,700,000, the main items of expense being \$200,000 for the police department, \$222,000 for fire department, \$67,000 for street lighting, \$60,000 for hospitals, asylums, and other charitable institutions, \$50,000 for parks, and \$500,000 for schools Pop, 1890, 48,866, 1900, 70,996, 1910, 102,054, 1913 (est), 113,000

Bridgeport, first settled in 1665, was known as Pequonnock, 1665-94, Fairfield Village, 1694-1701, and Stratfield, 1701-1880 Until incorporated as the Borough of Bridgeport in 1800, it formed part of Fairfield and of Stratford townships In 1836 it became a city, and in 1870 it was enlarged by the addition of a part of Fairfield, and in 1899 of Summerfield and West Stratford Consult Orenti, *A History of the Old Town of Stratford and the City of Bridgeport* (New Haven, 1886), and Waldo, *The Standard's History of Bridgeport* (Bridgeport, 1897)

BRIDGEPORT A village in Belmont Co, Ohio, on the Ohio River opposite Wheeling, W Va, with which it has bridge connection, and on the Pennsylvania and the Baltimore and

Ohio railroads (Map Ohio, J 5) The village is in a coal-mining region, and has glass and sheet and tin mills The government is vested in a mayor and a council Pop, 1900, 3963, 1910, 3974

BRIDGEPORT A borough in Montgomery Co, Pa, 18 miles north of Philadelphia, on the Schuylkill River, on the Philadelphia and Reading Railroad, and on the line of the Schuylkill Navigation Co (Map Pennsylvania, L 7) It has paper, flour, cotton, and woolen mills, steel-works, bikeyards, etc Bridgeport is 6 miles from Valley Forge, and Washington passed through the town with his army on his way to take up winter quarters in 1777 Pop, 1900, 3097, 1910, 3860

BRIDGEER'S PASS An elevated defile in the Rocky Mountains, in southwestern Wyoming, through which the overland stages went before the opening of the Pacific Railroad It is several miles long and in most places has almost perpendicular side walls from 1000 to 2500 feet high

BRIDGES, LAW RELATING TO Legislative authority to erect a bridge is necessary in three cases first, when toll is demanded for its use—the right to take toll being a franchise which cannot be claimed without express grant from the State, second, when the State owns the bed of the stream over which the bridge extends, as is the case in all public or navigable streams, third, when the structure interferes or threatens to interfere with navigation In the last case the authority of our State governments is subject to the power given to Congress by the Federal Constitution to "regulate commerce with foreign nations, and among the several States" (Art I, Sec 8) The States may authorize bridges over navigable streams and may regulate their size, form, and manner of construction Until Congress intervenes in such cases the power of the States is unlimited When it does intervene, however, its will is supreme, and its legislation, within the limits of the constitutional grant, overrides that of any State A bridge constructed over a navigable river in pursuance of an act of Congress is a lawful structure, however much it may interfere with the public right of navigation It is a statutory felony unlawfully and maliciously to pull or throw down or in any way to destroy or do injury to any bridge with intent to make it dangerous or impassable

BRIDGES, ROBERT (1844—) An English poet He was educated at Eton and at Corpus Christi College, Oxford, studied medicine at St Bartholomew's Hospital, London, and held several important hospital appointments before his retirement (1882) Bridges has published eight plays and several volumes of verse, often privately printed His choicest poems (with bibliography) have been reprinted in 3 vols (London, 1898-1901) Late Victorian poetry probably has nothing better than *Prometheus, Eros and Psyche, Achilles in Troy, and Shorter Poems* He is also the author of eight plays of which *Nero* is the best known Bridges has also written on Milton and Keats Especially noteworthy is his *Milton's Prosody* (Oxford, 1893), which has been enlarged and reprinted with an essay by W J Stone on "Classical Metres in English Verse" (Oxford, 1901) His *Poetical Works, Excluding the Eight Dramas*, appeared in 1913, in which year he was appointed Poet Laureate to succeed Alfred Austin

BRIDGES, ROBERT (pen name "Droch") (1858-). An American editor and author. He was born at Shippensburg, Pa., July 13, 1858. After graduating at Princeton he became connected with the New York *Evening Post* and in 1887 was made assistant editor of *Scribner's Magazine*. He is best known for the sprightly reviews which for many years he contributed to *Life* over the signature "Droch." He is also the author of poems and of two prose volumes, *Overheard in Arcady* (1894) and *Suppressed Chapters and Other Bookishness* (1895). His poems were collected in 1902 under the title *Bramble Brae*. In 1904 he wrote *The Roosevelt Book*.

BRIDGES AND DOCKS, MILITARY. The principal types of military bridges for the passage of troops and their supplies are the pontoon or floating, the spar, the trestle, and the suspension bridge. In most cases they must be constructed rapidly, and of such materials as are available, there being usually little time for refined calculations and for procuring the most suitable materials. The sizes of the parts of a military bridge depend primarily, as in other engineering structures, on the loads to be carried. Only in special cases will the width differ much from 8 to 10 feet. This is ample to provide for the passage of infantry in fours, cavalry in column of twos, and guns and wagons fully horsed. It is considered desirable that, in whatever formation the troops may pass, the structure should be made strong enough to sustain them when crowded as a result of some stoppage in that portion of the column which has already crossed. In most cases 100 pounds to the square foot may be taken as the uniform weight for which a bridge intended for the passage of infantry should be made safe. If proportioned for this load, it will also be strong enough for the passage of the various train wagons and of field guns and carriages. If, however, it is to be crossed by steam-traction engines, motor trucks, motor tractors, or other unusually heavy loads, additional precautions may be necessary to enable it to carry them with safety.

In the United States army, where the pontoon bridge was extensively and effectively employed during the Civil War, the bridge material of the Corps of Engineers is included in reserve and advance-guard trains. Where a large army is operating in the field and wide and swiftly flowing rivers are to be crossed the reserve or heavy train must accompany the troops. Such a train is divided into four pontoon divisions and one supply division. Each pontoon division is complete in itself, containing all the material necessary for constructing a bridge 225 feet in length. Each division is divided into four sections—two pontoon and two abutment sections—each pontoon section consisting of three pontoon wagons and one chess wagon. These four wagons contain the material for three bays (or 60 feet) of the bridge. If it is desired to vary the length of a single division, it can be done by diminishing or increasing the number of pontoon sections in the train. The pontoons are flat-bottom boats 31 feet in length, and with a maximum breadth of 5 feet 8 inches, of about 9½ tons' burden, and with sufficient capacity to transfer 40 men fully armed and equipped, besides its crew of pontoniers.

Pontoon bridges may be constructed either by the method of successive pontoons, by rafts, by

parts, or by conversion. The first mentioned is the most usual method. In following it, the pontoons are placed 20 feet apart, at right angles to the axis of a bridge, and anchored upstream and downstream to hold them in position. Five lines of floor beams, known technically as "balks," 5 inches square, rest on the pontoons and are firmly lashed to them. On these floor planks, 1½ inches thick and known as chess, are laid; these are held in position by side rails, lashed through notches in the chess to the balk beneath. The width of the bridge between side rails, when finished, is 10 feet. Bridges of this type received the hardest kind of usage during the Civil War and proved clearly their great value. In the month of February, 1862, a pontoon bridge composed of 60 boats of a reserve train was thrown across the Potomac at Harper's Ferry. The river was then a perfect torrent, the water being 15 feet above the summer level and filled with driftwood and floating ice. Under these unfavorable circumstances the bridge was completed in eight hours, and General Banks's corps, with all its trains and artillery, passed over it without accident or delay.

During the year of 1863 the pontoon train accompanied the army in all its marches through Virginia, frequently bridging the Potomac, Rapidan, and Rappahannock. The headquarters train in 1864 was followed by an advance-guard or light train, which, when a crossing was to be made by surprise, was sent forward with the cavalry to cover the construction of the bridge and hold the position until the main body arrived.

The advance-guard equipment is similar, in general principles, to the reserve. The pontoon, however, instead of being made entirely of wood, is made of canvas held in shape by wooden frames, which can be knocked down for transportation. For transportation purposes the material is so packed that the pontoon wagon contains all the materials for a single bay of 16 feet. The division may therefore be increased or diminished by one or more pontoon wagons, if it is desired to increase or diminish the length of the bridge in units of 16 feet. The width of the bridge is 2 feet less than that of the wooden pontoon bridge. The canvas pontoon, while possessing the advantage over the wooden pontoon of being more easily transported, will of course not stand as hard service. At the same time it has shown its usefulness on many occasions. The pontoon trains with the Army of the Cumberland, in its march from Chattanooga to Atlanta, Savannah, and Washington, in the latter part of the Civil War, were of canvas and gave excellent satisfaction. Where pontoon bridges are constructed at night, with a view to making a passage and surprising the enemy, the floor of the bridge should be covered with straw, in order to reduce the noise of construction to a minimum. Many substitutes for pontoons, such as floating supports, have been devised. Among the more important are rafts made of casks lashed to frames, rafts of timber, and boats of commerce.

European armies have spent considerable effort in attempts to design satisfactory sectional pontoon boats. Instead of using two different types of boat for advance-guard and reserve trains, their general idea is to have boats made of interchangeable sections of which a minimum number shall be joined together in the field to

make a pontoon for their lightest work. When heavier loads must be carried, additional sections are joined to each pontoon, making it of sufficient length, strength, and buoyancy to carry the desired load.

Spar bridges are made with round timber usually cut near the site of the bridge. For narrower spaces of 25 feet or less, the balks consist of single trees stretching across the river. The roadway is made of small saplings smoothed off on top or covered with dirt. For spaces of 30 to 35 feet single lock bridges are usually the most suitable. To construct this type two trapezoidal frames are made of timbers lashed together and braced by diagonal braces lashed to the legs of the frame. These are put in position on the opposite banks, and then lowered so as to rest their tops on each other and form an intermediate support above the middle of the stream for the balk or roadway bearers. For a still wider stream double-lock bridges can be used. In these the frames, instead of resting on each other, rest on cross timbers held apart by straining beams. These cross timbers furnish two intermediate supports over the gap for the balk. For still wider openings the frames are made considerably longer, so that they support each other at a point not less than 10 feet above the roadway. From their junction an additional roadway bearer is suspended by ropes. This, together with the points where the roadway crosses the two frames, gives three points of support.

One of the most generally useful of all the types of bridge is the trestle bridge. Vertical frames are constructed, on which the balks carrying the roadway are placed. In cases where a single trestle is not high enough to come from the bottom of the gap to the desired height of roadway, trestles can be so braced that they will hold others on top of them. This type of bridge particularly lends itself to railroad work, one of the most notable examples of the kind being the bridge across the Potomac Creek, Va., during the Civil War. This bridge was 80 feet high and 400 feet long.

Suspension bridges have not been of general application in the United States military service. The English have made some use of them. They are suitable for wide spans, where it is difficult to secure intermediate supports. An army traveling in a country where its service will probably require the construction of this type of bridge should make provision for carrying along the necessary wire cables, clips, and ropes. A bridge with a span of 100 feet can be constructed with such material, having a roadway 5 feet 8 inches wide in the clear. With a load of infantry in file crowded, the bridge has a stress of about 63,000 pounds in the cables and on the anchorages.

Where time allows or a semi-permanent structure must be provided, almost any of the various types of wood and composite trussed bridges in every-day use may be constructed. Attention has been given by military engineers to modifications of these types to permit of their most rapid construction with boards and other materials most readily carried by troops or most likely to be found en route. Attention has also been given to the design of metal trusses, the parts of which can on some expeditions be carried and erected promptly in the field.

The type of bridge to be used in a given case depends on many circumstances. An army

starting out for extended service in a country such as that covered by many of the operations of the Army of the Potomac in the Civil War—i.e., a rather low, flat country, with many broad streams—would naturally provide itself with pontoon bridges and, having them, would use this type wherever practicable. On the other hand, as the pontoon bridge must be near the surface of the water, it is not well adapted for use in a country where the streams are narrow and the banks so high that trouble would be experienced in the construction of approaches leading to the ends of the bridge. An army expecting to operate in a country provided with poor roads, but fairly well wooded, and having streams not too deep to permit of the establishment of cribs and trestles, might well rely on the trestle-and-spar bridge. If operating in a mountainous country, cut up by gorges and canyons and poorly provided with roads, it should carry the necessary cables, etc., for constructing suspension bridges over gaps too wide for spar bridges. Bridges have been constructed across streams just too deep for fording by running in wagons and laying the balks and roadway on top of them. Railroad bridges can be utilized for the passage of troops on foot and wagons by planking over the ties and sometimes covering with dirt. In many cases no bridge will be needed. In cold weather the ice may be sufficiently thick to permit the crossing of an army. Six inches of good ice will suffice for the passage of the usual loads accompanying an army, 2 inches permits the passage of infantry in single file on planks, 10 to 12 inches bears the heaviest loads of an army. In other cases, as in the famous passage of the Delaware by Washington, the army may be ferried over in boats. Modifications of this method have also been used. Rafts with large deck areas can be made with pontoons by lashing a number of the latter together and flooring them over with chess. On them men and horses can readily be ferried, while rafts of bamboo were used for transporting field artillery across rivers in the Philippines. If there is any current, these rafts are usually supported either by cables attached to anchors set some distance above in the middle of the stream or by cables attached to trolleys running on cables stretched across the stream. A river of shallow depth and moderate current may be forded, where the depth is too great for only short distances, the level of the bottom at these places may be raised temporarily by throwing in brush, logs, and other material. There have also been instances in history of the successful swimming of rivers by small bodies of troops.

Temporary piers or docks are sometimes required to facilitate the landing of troops and material. Such structures are rarely made stronger than to permit small boats, such as launches and lighters, to lie alongside of them and unload. They consist essentially of a top floor and of supports, the relation between the floor and supports being similar to that existing in bridges. The supports are generally either trestles of some type, usually pile-driven, or log cribs sunk with stone. A pierhead may be expedientized by securely anchoring a pontoon raft. When the construction of a pier or dock is not practicable or justified, an aerial cableway is sometimes used for landing field guns and other military material directly from a ship. To operate the cableway, the vessel is anchored and

a cable is stretched from its deck to a tripod extemporized on shore by men who have landed in small boats. A trolley, from which are suspended the various parts to be landed, is drawn along the cable by a rope running to the men stationed on shore.

For a comprehensive technical treatment of the subject of military bridges, consult: *Engineer's Field Manual*, part ii, Bridges, prepared under the direction of the Chief of Engineers, U.S.A. (2d revised ed., Washington, Government Printing Office, 1907); *The Chatham Manual of Military Engineering*, part iii; *Military Bridging and Use of Spars* (London, 1894). An interesting chapter on the "Passage of Rivers" may be found in Fieberger, *A Text-Book of Field Fortification* (New York, 1901).

BRIDGET, SAINT (1303-73) (more properly *Birgit* or *Brigitta*). 1. A Roman Catholic saint. She was born in the palace of Instad, near Upsala, the daughter of a prince of the blood royal of Sweden. In 1316 she married Ulf Gudmarsson, Prince of Nericia, a stripling of 18, by whom she had eight children, the youngest of whom, named Catherine (1336-81), became par excellence the female saint of Sweden. According to the legend, her husband and she made a pilgrimage to the shrine of St. James at Santiago de Compostela, in Spain. This was between 1341 and 1343. On their return they entered the Cistercian Monastery of Alvastra, on the east shore of Lake Vattern, southwest of Stockholm. The picturesque ruins are still standing. There Ulf died in 1344, but without taking monastic vows, and Bridget became a professed nun. From a child she had believed herself to have visions in which Christ appeared to her, and these visions now became more frequent. She felt called upon to found a new order to the homage of the Saviour. This she did in 1346. The first monastery was at Vadstena, on Lake Vattern, only some 10 miles north, on the same side of Alvastra and on her property. It is now a lunatic asylum. They received the rule of St. Augustine, to which St. Bridget herself added a few particulars, but constituted a new order—sometimes called the Order of St. Bridget, sometimes the Order of St. Salvator, or the Holy Saviour—which flourished in Sweden until 1595, when it was suppressed. In 1350 St. Bridget went to Rome, where she founded a hospice for pilgrims and Swedish students, and obtained the papal sanction for her order in 1370, which was reorganized by Leo X. After having made a pilgrimage to Palestine, she died in Rome on her return, July 23, 1373. Her bones were carried to Vadstena, and she herself was canonized in 1391 by Pope Boniface IX. Her festival is on the 8th of October. The *Revelationes Sanctæ Brigittæ*, accounts of her visions, and of the revelations in them, were translated into Latin by her confessors, keenly attacked by the celebrated Gerson, but obtained the approval of the Council of Basel and passed through many editions. Besides the *Revelations* there have been attributed to this saint a sermon on the Virgin, and five discourses on the passion of Jesus Christ, preceded by an introduction which was condemned by the congregation of the *Index*. For her autobiography and the history of the order, consult: *Scriptores Rerum Societarum Mediæ Aevi*, vol. iii (Stockholm, 1871-76); Eng. trans. of her *Revelations* (London, 1873); also the biographies by G. Binder (Munich, 1891), V. F. de Flavigny (Paris, 1892), and

F. J. Partridge (New York, 1888), of which the first treats also of her order. See BRIGITTINES.

2. Not to be confounded with this Swedish saint is another St. Bridget, St. Brigid, or St. Bride, as she is more commonly called—a native of Ireland, born at Faughart, 47 miles north of Dublin, 453—the child of a man of royal race and his bond servant. She was brought up by a wizard, who had bought her mother and whom she converted to Christianity, but was liberated by the king. She became a nun and founded the church and monastery of Kildare (the church of the Oak) and there died Feb. 1, 523. She was unquestionably a woman of rare ability and consecration and properly became, along with Patrick and Columba, one of the three great saints of Ireland. Her story, as told in Irish legends, is very attractive and based probably on facts. It is found in Whitley Stokes, *Three Middle-Irish Homilies on the Lives of Saints Patrick, Brigit, and Columba* (Calcutta, 1877). She was renowned for her beauty. To escape the temptations to which this dangerous gift exposed her, as well as the offers of marriage with which she was annoyed, she prayed God to make her ugly. Her prayer was granted, and she retired from the world, founded the monastery already mentioned, and devoted herself to the education of young girls. Her day falls on the 1st of February. She was held in great reverence both in England and Scotland and was regarded by the Douglasses as their tutelary saint. Consult: Knowles, *Life of St. Brigid* (New York, 1907); Westman, *Brigitta-studier* (Upsala, 1911); Wilkie, *St. Bride* (Boston, 1912).

BRIDGETON, brĭj'ton. A city, port of entry, and the county seat of Cumberland Co., N. J., 38 miles southeast of Philadelphia, at the head of navigation on the Cohane River, and on the New Jersey Central and the West Jersey and Seashore railroads (Map: New Jersey, B 5). Among its noteworthy features are the public library, Ivy Hall Seminary, city hospital, county hospital, and insane asylum, and fine county and government buildings. Bridgeton has good transportation facilities, and the surrounding region is exceedingly fertile and well cultivated. The manufactures of the city include glass, gas pipes, castings, machinery, hosiery, candy, shirts and shirtrwaists, dresses, carriages and wagons, boilers, lumber, and flour, and the canning of fruits and vegetables is carried on. Though settled long before the Revolution, Bridgeton was not incorporated until 1865. It was made a port of entry in 1790. The city has adopted a modified form of commission government. The water works are owned and operated by the municipality. Pop., 1890, 11,424; 1900, 13,913; 1910, 14,209. Consult Nichols, *The City of Bridgeton*, New Jersey (Philadelphia, 1889).

BRIDGE-TOWN. The capital of the British West Indian island of Barbados, situated on the west coast, along the northeast shore of Carlisle Bay (Map: West Indies, H 4). The town is the seat of Codrington College and of the Bishop of Barbados, and among its prominent structures are the government buildings, the town hall, hospital, and the buildings of the garrison. Its trade, valued at \$5,000,000 annually, consists of sugar, molasses, alous, and mineral oil, and it is the terminus of the only railroad on the island. Bridgetown was founded in the first half of the seventeenth century and for some time was known as Indian Bridge. It has

suffered severely from fires, notably in 1666, 1766, and 1845, and in 1831 it was visited by a disastrous hurricane Pop, 1911, 16,648

BRIDGEWATER A port of Lunenburg Co., Nova Scotia, at the head of the La Have estuary, 80 miles west of Halifax (Map Nova Scotia, E 4) Lumber constitutes its chief industry, and it contains the main offices and workshops of the Halifax and Southwestern Railway The neighborhood is resorted to for its excellent trout and salmon fishing The United States is represented by a consular agent The town has shipyards, planing, shingle, and carding mills, foundries and tanneries, wagon factories, granite and marble works, etc., and forest products are exported Bridgewater suffered from a destructive fire in 1899 Pop, 1901, 2293, 1911, 2775

BRIDGEWATER A town in Plymouth Co., Mass., 27 miles south of Boston, on the New York, New Haven and Hartford Railroad (Map Massachusetts, F 4) The town has a public library, and is the seat of a State normal school and of a State farm It contains iron works, a foundry, a tack factory, shoe factories, brickyards, and a cotton-gin factory The government is administered by town meetings, held annually Pop, 1900, 5806, 1910, 7688 Settled in 1645 as a plantation of Duxbury, Bridgewater was incorporated as a separate township in 1656, when its old name, Nunkatasset, was discarded It was one of the first towns to be settled in the interior of Massachusetts It included the territory of the towns later incorporated as East, West, and North Bridgewater (now Brockton) Consult Mitchell, *History of Bridgewater* (Bridgewater, 1897)

BRIDGEWATER, FRANCIS EGERTON, third and last DUKE OF (1730-1803) An English canal builder, sometimes called the "Father of British Inland Navigation" He was the youngest son of Scioop, fourth Earl and first Duke of Bridgewater, and succeeded his elder brother, second Duke, in 1748 In 1760 he obtained an Act of Parliament for making a navigable canal from Worsley to Salford, Lancashire, and carrying it over the Mersey and Irwell at Barton by an aqueduct 39 feet above the surface of the water, and 200 yards long, thus forming a communication between his coal mines at Worsley and Manchester on one level In this and his later great undertakings he was aided by the skill of James Brindley (q v), the celebrated engineer, and expended large sums of money He was also a liberal promoter of the Grand Trunk Navigation, and the impulse he thus gave to the internal navigation of England led to the extension of the canal system throughout the kingdom

BRIDGEWATER, FRANCIS HENRY EGERTON, eighth EARL OF (1750-1820) The son of John Egerton, Bishop of Durham, and grandnephew of the first Duke of Bridgewater. He was born in London, Nov. 11, 1750, and succeeded his brother as Earl in 1823 He was educated at Oxford, becoming fellow of All Souls College, 1780 The same year he became prebendary of Durham, in 1781 rector of Middle, and in 1797 of Whitelchurch, both in Shropshire, and he held these preferments till his death He was prince of the Holy Roman Empire He was very eccentric, for his home in Paris, where he lived the latter part of his life, was filled with cats and dogs, some dressed up as men and women, and he drove them out in his carriage and fed them

at his table When he died unmarried, in Paris, Feb. 11, 1829, the title became extinct By his last will, dated Feb. 25, 1825, he left £8000, invested in the public funds, to be paid to the author of the best treatise "*On the Power, Wisdom, and Goodness of God as Manifested in the Creation*," illustrating such work by all reasonable arguments as, for instance, the variety and formation of God's creatures, in the animal, vegetable, and mineral kingdoms, the effect of digestion and thereby of conversion, the construction of the hand of man and an infinite variety of other arguments, and also by discoveries, ancient and modern, in arts, sciences, and the whole extent of modern literature" The then president of the Royal Society of London, Davies Gilbert, to whom the selection of the author was left, with the advice of the Archbishop of Canterbury, the Bishop of London, and a noble friend of the deceased Earl, judiciously resolved that, instead of being given to one man for one work, the money should be allotted to eight different persons for eight separate treatises, though all connected with the same primary theme (See **BRIDGEWATER TREATISES**) He wrote himself a number of books, biographical, historical, and scientific He left his manuscripts, relating mostly to French and Italian history and literature, to the British Museum, with 112,000 to keep up the collection

BRIDGEWATER TREATISES Eight celebrated works *On the Power, Wisdom, and Goodness of God*, by eight of the most eminent authors in their respective departments, published under a bequest of the eighth Earl of Bridgewater (q v), whereby each received £1000 with the copyright of his own treatise They are Thomas Chalmers, *The Adaptation of External Nature to the Moral and Intellectual Constitution of Man* (London, 1833), William Prout, *Chemistry, Meteorology, and the Function of Digestion Considered with Reference to Natural Theology* (London, 1834), William Kirby, *History, Habits, and Instincts of Animals* (London, 1835), Buckland, *Geology and Mineralogy Considered with Reference to Natural Theology* (London, 1837), Charles Bell, *The Hand Its Mechanism and Vital Endowments as Evincing Design* (London, 1837), John Kidd, *Adaptation of External Nature to Physical Condition of Man* (London, 1837), William Whewell, *Astronomy and General Physics Considered with Reference to Natural Theology* (London, 1839), Peter Mark Roget, *Animal and Vegetable Physiology Considered with Reference to Natural Theology* (London, 1840)

BRIDGMAN, BELJAH COLEMAN (1801-61) An American missionary to China He was born in Massachusetts, was a graduate of Amherst (1826) and of Andover (1829) He went as missionary to China in the year last named and joined Dr. Morrison at Canton Having learned to speak and write the Chinese language, he acted as official interpreter for the Imperial Commissioner Lin (1839), and afterward as interpreter and secretary to the United States Minister, Caleb Cushing (1844) *The Chinese Repository*, a valuable magazine, was founded by him In 1847 he established a mission station at Shanghai, where his version of the Bible was printed His Chinese *Chrestomathy*, in the Canton dialect, a quarto of 734 pages, printed and contributed to by S. Wells Williams, was the first practical manual of the Cantonese

dialect prepared in China. He died in 1861 at Shanghai, in the fullness of his powers. His life has been described by his widow, Mrs. E. J. G. Bridgman, under the title *The Pioneer of American Missions in China* (New York, 1864).

BRIDGMAN, FREDERIC ARTHUR (1847-). An American genre and historical painter. He was born at Tuskegee, Ala., Nov. 10, 1847. From 1863 to 1866 he was a steel engraver for the American Bank Note Company. In the latter year he went to Paris, where he studied in the Ecole des Beaux-Arts under Gérôme. His earliest paintings were Breton and Norman subjects, like the well-known "American Circus in Normandy," in which characteristic American types in the performers were in interesting contrast to the French peasants who filled the seats; and "Two Gulls in a Canoe." A voyage to Algiers in 1871 caused a change in his subjects, which were henceforth Oriental, studied in extensive travels in northern Africa, Egypt, and Nubia. His later work, though sometimes deficient in line, is characterized by brilliancy of color and facility of execution. Although residing in Paris, he exhibits frequently in the United States, and was elected to the National Academy in 1891. In 1900 he was chairman of the department of American Art in the Paris Exposition. He is a officer of the Legion of Honor (1907) and of the Bavarian Order of St. Michael and has received several medals. Among his principal works are: "The Diligence" (Liverpool Gallery); "The Procession of Apis" (James Gordon Bennett); "The Burial of a Mummy," which received a medal at the Paris Exposition of 1878; "The Destruction of Pharaoh's Host" (1892), in the Academy of Arts, St. Petersburg, which possesses two other works by him; "Ars Dramatis"; "Procession in Honor of Isis"; "The Bocher, Biskra" and the "Greek Girl." He is a composer of orchestral music, has written symphonies, and is the author of several works on art subjects in English and French.

BRIDGMAN, HERBERT LAWRENCE (1844-). An American journalist and Arctic explorer. He was born at Amherst, Mass., graduated in 1866 at Amherst College, entered journalism, and became associate editor of the Brooklyn (N. Y.) *Standard-Union*. He accompanied and was historian of the Peary auxiliary expedition in 1894; in 1897 assisted Professor Libbey of Princeton University in scaling the Mesa Encantada ('Enchanted Mesa') of New Mexico; commanded the Peary auxiliary expeditions of 1899 and 1901; and was a delegate to the International Polar Commission at Brussels in 1908. He is the author of *The Sudan-Africa from Sea to Centre* (1905).

BRIDGMAN, LAURA DEWEY (1829-89). A blind deaf-mute, born in Hanover, N. H., Dec. 21, 1829. As the result of a fever, at the age of two, she lost sight, smell, and hearing. When she was eight years old, Dr. Howe, of Boston, undertook her education, and succeeded in teaching her to read and write well, and to think clearly, so that she was later employed in teaching. Consult Lampton, *Life and Education of Laura Dewey Bridgman* (Boston, 1878); Mrs. Elliott and Hall, *Laura Bridgman* (Boston, 1903).

BRIDGE/NORTH (for *Brugge Morfe*, the bridge of the wood Morfe, on the opposite bank of the Severn). A town of Shropshire, England, on both sides of the Severn, 20 miles southeast

of Shrewsbury (Map: England, D 4). It consists of an upper and a lower town connected by a bridge over the Severn. A tower, all that remains of the ancient Norman castle, stands on a rock 60 feet above the river. There are two churches, and a town hall dating from 1652. The town owns its water and gas works and maintains markets and a cemetery. It has an ancient Latin school, a mechanics' school, and a public library. Its industries include the manufacture of carpets and woolen goods. The house in which Thomas Percy, author of the *Reliques*, was born, and which was built in 1580, is still standing. Pop., 1891, 5865, 1901, 6049; 1911, 5708. The town, which was at one time called *Bruges* or *Brug*, is said to be of Saxon origin. In the beginning of the twelfth century Robert de Belesme defended the town unsuccessfully against Henry I. It was besieged in the same century by Henry II, and during the Civil War it was burned by the parliamentary forces.

BRIDGTON. A town in Cumberland Co., Me., 38 miles northwest of Portland, on the Bridgton and Saco River and the Maine Central railroads (Map: Maine, B 4). Situated in the White Mountains and almost surrounded by lakes, the town is a popular summer resort. It contains Bridgton Academy (incorporated 1808), a public library, and a woolen goods factory. Pop., 1900, 2868; 1910, 2960. Bridgton was settled in 1770 by Capt. Benjamin Kimball and was formerly known as Pondicherry.

BRIDGE/WATER (from *Burgh-Walter*, the town of Walter Douay, its founder). A town and port of Somersetshire, England, on the Parret, 12 miles by river from the Bristol Channel and 30 miles southwest of Bristol (Map: England, D 5). The town is chiefly built of brick. The Parret admits vessels of 700 tons up to the town; it rises 36 feet at springtides and is subject to a tidal bore often detrimental to shipping, but the town has considerable coastwise trade. The town owns its water supply and maintains public libraries and baths. Bath or scouring bricks, peculiar to Bridgewater, are made here of a mixture of sand and clay found in the river. There are also factories for the manufacture of iron and copper ware. Admiral Blake was a native of Bridgewater. Pop., 1891, 13,264; 1901, 15,209; 1911, 16,802. The town received its first charter from King John in 1201. It suffered severely in the Civil War, when it was taken in turn by both Royalists and Roundheads. Sedgemoor, the scene of the defeat of the Duke of Monmouth by the royal forces in 1685, lies a little to the southeast of the town.

BRIDLE (from its similarity to the bridle of a horse). A chain or rope span, the ends being made fast and the power or weight between, the bowlines are attached to the sails in this way. The chains of permanent moorings, if the ends are attached to separate anchors, form a *mooring bridle*, the vessel being made fast to the centre of the span.

BRIDLE AND BIT. See **SADDLERY**.

BRIDLINGTON, local pron. burlington, or BURLINGTON. A seacoast town in the East Riding of Yorkshire, England, 6 miles west of Flamborough Head, 40 miles east-northeast of York (Map: England, F 2). Bridlington is situated on a gentle slope in a recess of a beautiful bay. It has the aspect of an old town with narrow, irregular streets. Bridlington is well known as a watering place. It has an excellent

harbor, carries on a considerable trade in grain, and possesses an intermittent spring which supplies the town with fresh water. The town was incorporated in 1899. It has several schools and a library. Pop., 1891, 8919, 1901, 12,473, 1911, 14,334. Bridlington is noted for its chalk-flint fossils. Remains of Danish and Saxon times are found around Bridlington. After the Conquest it became the site of a rich Augustine abbey, traces of which still exist in the parish church of St Mary. Consult Thompson, *Historical Sketches of Bridlington* (Bridlington, 1821).

BRIDFORD A seaport town of Dorsetshire, England, at the confluence of the Asker and Brit, 2 miles from the English Channel and 16 miles west-northwest of Dorchester (Map, England, D 6). Its public buildings include the fine parish church of St Mary, of the Perpendicular period, a town hall, markets, mechanics' institute, and school of art. It has manufactures of ropes, cordage, sailcloth, etc., and carries on some foreign and coasting trade. Bridport mint is mentioned in the *Domesday Book*. From Henry VIII it received a monopoly of the cordage supply for the British navy. Pop., 1891, 6611, 1901, 5962, 1911, 5919.

BRIE, brē An ancient district of France situated between the rivers Seine and Maine, now comprised in the departments of Aisne, Marne, and Seine-et-Marne. Its capital was Meaux. In olden times it was almost wholly covered by a forest. Subdued by the Franks, it formed, successively, part of the Kingdom of Neustria and of the provinces of Champagne and Île-de-France. It was ruled by its own counts until it became crown property in 1361. Brie was, and is still, celebrated for its grain and dairy products, especially cheese.

BRIEF (OF, from Lat. *brevis*, brief) In the ancient law writers, a writ or breve. Now, a concise and orderly statement of the points of law, pleadings, and evidence to be laid by one party to a cause before a court at its trial. The word is used in England and in the United States with very different meanings. In Great Britain it is the duty of the attorney or solicitor to prepare the case only—to draw up and serve papers, to marshal the evidence, to prepare the case for trial generally, and to the barrister is committed the task of arguing the case before the court, introducing the evidence, cross-examining, and taking entire conduct of the case in open court. A brief, under this English practice, is the concise statement of the case as it leaves the hands of the attorney, and it serves as a guide to the barrister and as his instructions for proceeding in open court. As soon as a counsel is briefed he has authority to act as his client's representative in all matters involved in the litigation. (See **BARISTER**.)

In the practice of courts in the United States, one person serves the office of both the English attorney and barrister. In our courts, accordingly, the brief is the abbreviated statement of pleadings, affidavits, evidence, and all points of law to be argued, prepared by the counsel for his own use, or to lay before the court as an assistance in following his presentation of the case. In appellate courts of the States, and in the United States courts, the brief is the skeleton or analysis of the argument prepared by the counsel, setting forth the legal propositions he offers, citing cases in support thereof, and indicating the rulings for which he argues. It is

usual that such a brief should be printed and furnished to the court, to the official reporter, and to the opposing counsel. Consult authorities referred to under **PRACTICE** and N. Abbott, *Brief Making and the Use of Law Books* (St. Paul, 1906).

The phrase *Brief of Title* is sometimes employed in place of the usual term *Abstract of Title* (q.v.), to denote the concise statement of the deeds, conveyances, and changes in ownership which may have occurred in the history of the title to a certain piece of real estate.

BRIEF, PAPAL (Lat. *brevis*, short, of Ger. *Brief*, a letter). A word used to denote certain letters of the Popes, which, however, do not receive their name from the brevity of the composition, but from the smallness of the calligraphy. The papal brief differs from the papal bull (q.v.) in several points. It gives decisions on matters of inferior importance, such as discipline, dispensations, release from vows, indulgences, etc., which do not necessarily require the deliberations of a conclave of cardinals. Still, it is not to be confounded with *motu proprio*, or private epistle of the Pope as an individual, as its contents are always of an official character, though expressing a kind of familiar parental authority, and the brief is consequently superscribed *Papa*, while the form of address is *dilecte fili* ('beloved son'). It is signed not by the Pope, but by the *segregario de brev*, an officer of the papal chancery, with red wax, and only with the Pope's private seal, the fisherman's ring. Hence it concludes with the words *Datum Romæ sub annulo piscatoris* ('given at Rome under the ring of the fisherman').

BRIEG, brĕk (Slav *Brĕgŭ*, bank) A town of Silesia, Prussia, situated on the left bank of the Oder, about 27 miles southeast of Breslau, on the railway line between Breslau and Vienna (Map, Prussia, G 3). It was formerly surrounded by ramparts, which have been converted into promenades. The town has a number of manufactories and produces principally machines, textiles, cigars, and sugar. It has a cattle market of some importance. Pop., 1900, 24,114, 1905, 27,486, 1910, 29,035. Consult Schönborn, *Geschichte der Stadt und des Fürstentums Brieg* (Brieg, 1907).

BRIEGER, brĕ'gĕr, JOHANN FRIEDRICH THEODOR (1842-) A German Protestant historian. He was born at Greifswald, June 4, 1842, studied there and at Erlangen and Tübingen, became professor of Church history at Marburg (1873) and at Leipzig (1886). He edits the *Zeitschrift für Kirchengeschichte* (Gotha) and has written principally upon the German Reformation. Among his works are *Quellen und Forschungen zur Geschichte der Reformation* (1884), *Die theologischen Promotionen auf der Universität Leipzig 1428-1559* (1894).

BRIEGLER, brĕ'glĕr, HANS KARL (1805-79) A German jurist, born in Bayreuth. He was professor of law at Erlangen in 1842, and at Göttingen in 1845. He achieved distinction by establishing an historical basis for the theory of civil procedure. His investigations into the mediæval literature on this subject are also important. In addition to his principal work, *Ueber caelutatorische Urkunden und Ehelutprozess* (1839), he wrote *Summarium Cognoscere, Quid et Quale Fuerit apud Romanos* (1843), *Rechtsfälle zum akademischen Gebrauch* (1848-50), *Einleitung in die Theorie der sum-*

marischen Prozesse (1859); *Vermischte Abhandlungen* (1868).

BRIEL, brél, or **BRIELLE**, brâ-êl', or **THE BRILL**. A fortified seaport town on the north side of the island of Vorne, in the province of South Holland, Netherlands (Map: Netherlands, C 3). It is situated near the mouth of the Meuse, about 14 miles west of Rotterdam. Briel possesses a good harbor and is intersected by several canals. The large St. Catherine's Church contains the beautiful tomb of Admiral Philip-pus van Almonde. The town has some trade. Pop., 1900, 4107; 1911, 3810. The seizure of Briel by the "Beggars of the Sea," under William de la Marck, April, 1572, opened the long struggle for independence waged by the Netherlands against Philip of Spain.

BRIENNE-LE-CHÂTEAU, brê-ên' le sha'tô' (Fr. Castle Brienne, anciently, Lat. *Brienna*, capital of the *Bramovices*), or **BRIENNE-NAPOLEON**, -na'pô'le-ôn'. A small town in the department of Aube, France, on the right bank of the river Aube, about 14 miles northwest of Bar-sur-Aube. It is celebrated as the place where Napoleon I received his earliest military education, entering the military school here in 1779, when he was 10 years old, and remaining until 1784. On Jan. 20, 1814, Brienne-le-Château was the scene of a bloody and indecisive battle between the armies of Napoleon and Blücher. Consult Jaquot, *Notice historique sur Brienne* (Paris, 1832).

BRIENZ, brê-ên's'. A town of the canton of Bern, Switzerland, beautifully situated at the foot of the Bernese Alps, on the northeast shore of the lake of the same name, and about 30 miles east-southeast of Bern (Map: Switzerland, C 2). The town is the centre of the Oberland wood-carving industry, and its cheese is held in high repute. Pop., 1900, 2600; 1910, 2518.

BRIENZ LAKE or **A**. A valley lake in Switzerland, visited by many tourists. It is 1850 feet above sea level, is about 8 miles long and 2 miles broad, is formed by the river Aar, at the foot of the Hasli valley, and, through the same river, discharges its waters into Lake Thun (Map: Switzerland, B 2). Its average depth, which is said to be in some places 900 feet, is about 500 feet. It is surrounded by elevated mountains, the principal one being the Rothorn, from which splendid views of the whole range of the Bernese Alps are obtained. A small steamer plies daily on the lake between Brienz and Interlaken, touching at the celebrated Giessbach Fall on every trip.

BRIER CREEK. A stream in Warren Co., Ga., at whose junction with the Savannah a force of about 1500 Americans (mostly militia), under General Ashe, was defeated by a somewhat larger British force, under General Prevost, on March 3, 1779. Of the British, only 5 were killed and 11 wounded; while of the Americans 200 were killed or wounded, 200 were taken prisoners, and only about 450 reached the main army, the rest having retired to their homes. The victory restored Augusta to the British, and reinstated temporarily the royal government of Georgia.

BRIERLEY, BENJAMIN (1825-96). An English writer, born at Failsworth, Lancashire. After meagre schooling he became a Manchester weaver, but read extensively in the English poets. It was after 1855 that he began to be known for his stories and verses of Lancashire, written, many in dialect, under the pseudonym

of "Ab-o'-th'-Yate," and very accurate in point of local color. These include: *A Summer Day in Daisy Nook* (1859); *Tales and Sketches of Lancashire Life* (1863); *The Laycock of Langley Side* (1864); *Irkdale* (1865). *Ab-o'-th'-Yate in Yankee Land* (1887). He edited *Ben Brierley's Journal* (1869-91). A collected edition of his works appeared in 1882-86.

BRIERLEY HILL (*brier ley, lea*, field). A town of Staffordshire, England, 2 miles north-northeast of Stourbridge, on the Stour (Map: England, D 4). Large quantities of coal, iron, and fire clay are found in the neighborhood, and its principal industries are connected with coal mines, iron foundries, glass and pottery works, and brick kilns. Pop., 1891, 11,831; 1901, 12,040; 1911, 12,263.

BRIERLY, BOB. The principal character in Tom Taylor's play *The Ticket-of-Leave Man*.

BRIERRE DE BOISMONT, brê'râ' de bwis'môn', ALEXANDRE JACQUES FRANÇOIS (1788-1831). A French physician and authority on insanity, born in Rouen. He took his degree in medicine in 1825, in which year he published his first work, *Éléments de botanique*. In 1831 he spent some months in Poland, studying the cholera, and upon his return published the results of his investigations in a treatise, which obtained for him a gold medal from the Institute. He then turned his attention to mental diseases, founding and maintaining an asylum for the treatment of the insane. His principal works are: *La pellagre et la folie pellagreuse* (1834); *La menstruation* (1842); *Le délire aigu* (1844); *Les hallucinations* (1845); *Le suicide* (1854).

BRIEUX, brê'x', EUGÈNE (1858-). A French dramatist, born in Paris of poor parents. He began his career as a journalist, but at the age of 21 collaborated with Gaston Salandri in the production of a one-act play entitled *Bernard Pataway*. He did not, however, begin writing seriously for the stage till 11 years later, when he made his first success in *Ménage d'artistes* at the Théâtre Libre (1890). After this he became one of the most prolific of French dramatists. He was elected to the Academy in 1909. His work is distinguished by seriousness of purpose and deep insight into the social conditions of his time. His plays, almost without exception, deal with definite social problems of the day. *Blanchette* (1892) is an arraignment of the system of public education in its application to girls of the working class; *M. de Réboral* (1892) is a satire on pharisaism; *L'Engrenage* (1894) shows the overwhelming temptations that a public official is subjected to under the French political system; and *Les bienfaiteurs* (1896) is a scathing denunciation of the insincerity and frivolity of fashionable charity. By *L'Évasion* (1896) is exposed the fallacy of indiscriminate belief in the scientific doctrine of heredity and by *Les trois filles de M. Dupont* the miseries that French law and custom impose on poor girls of the middle class. *Le berceau* (1899) is a plea for the indissolubility of the marriage bond after a child has been born; *Le résultat des courses* (1898) shows the evil results of betting among workmen; while *La robe rouge* (1901), crowned by the Academy, exposes the injustice of the law. In *Les remplaçants* (1901) Brieux attacks the practice of putting children out to nurse; in *Les aravies* (1901) he paints the horrors of venereal disease; and in *Petite amie* (1902) he

portrays the life of a Parisian shop girl *Mateuette* (1903) is an arraignment of society for its attitude toward women who become mothers outside of marriage. In his later plays—*Les hennetons* (1906), *La française* (1907), *Simone* (1908), *Suzette* (1910), *La foi* (1912), *La femme seule* (1912)—he shows more lightness and a greater desire for artistic expression, but even in these he is obviously the social reformer rather than a literary artist. A translation of *Les amants* was produced in New York in 1913 with notable success. Consult *Three Plays by Brieux*, with a preface by Bernard Shaw (New York, 1911).

BRIG and BRIGANTINE (Fr. *brigantin*, It. *brigantino*, from *brigante*, pirate. *Brig* is the shortened form, just as *cab*, from *cabriolet*). A *brig* is a square-rigged vessel with two masts. An *hermaphrodite brig* is a two-masted vessel, with the mainmast of a schooner and the foremast of a brig. A brig's mainsail is the lowest square sail on the mainmast, whereas the mainsail of a brigantine is a fore-and-aft sail like that of a schooner. Aside from its mainsail a brigantine is like a brig.

BRIG A town in the canton of Valais, Switzerland, on the Rhône, 17 miles east of Leuk (Map Switzerland, C 2). It is situated at the foot of the Simplon Pass, 1½ miles above the north end of the Simplon Tunnel, and commands a view of magnificent mountain scenery. It has an ancient Jesuit monastery, and the sixteenth-century Stockhalpe Castle, the master of which controlled and protected the trade over the Simplon. Pop. 1900, 2198, 1910, 2699.

BRIGADE (Fr. It. *brigata*, company, from *brigare*, to strive, *briga*, strife). A number of regiments, battalions, or corps of any arm of the service combined in one group and under one general command. The system of grouping battalions and regiments into brigades was first introduced by the great generals of France in the reign of Louis XIV (1642-1715)—Turenne, Condé, and others, and in England by Marlborough. The idea was soon imitated by every army in Europe, the rule generally being to group together regiments of infantry of two or three battalions, each battalion 500 or 600 strong, and regiments of cavalry of four squadrons, each having a strength of from 100 to 150. Artillery was not as yet prepared for this form of organization, as most of the guns were attached to the regiments. The organization of the army as a whole is the factor which determines the character and strength of component parts in times of peace, alterations made in the field are usually to facilitate command, to insure greater mobility and better adaptation to the circumstances with which the army as a whole is confronted. In the United States a brigade may consist of either infantry, cavalry, or artillery, or, in the case of a reinforced brigade, of a combination of all three arms, under the command of a brigadier general. There are usually three regiments in a brigade, though the number may be greater or less. In England the strength of a brigade varies with the circumstances under which it is formed. It has no arbitrary strength or place in the organization of the army. In continental European armies two regiments is the average strength in time of peace. See **ARMY ORGANIZATION**.

BRIGADE MAJOR The adjutant of a brigade commander. The title is not employed in the United States army. See **ADJUTANT**.

BRIGADIER GENERAL (Fr. from *brigade*). In the United States army, the rank appropriate to the officer commanding a brigade (qv). The rank is intermediate between that of colonel and major general. In the English and European armies generally, the brigade commander is usually a colonel or lieutenant colonel, who for a brief period or for some particular service, and largely because of his seniority, is placed upon brigade duties. The brigade almost invariably contains the brigadier general's own regiment. See **RANK AND COMMAND**.

BRIG'ANDAGE (Fr. OF *brigand*, a foot soldier, brigand, from It. *briga*, strife). The system of robbery practiced by armed men, or bands of armed men, on the highways, in the mountains, or in waste places. At the dawn of history violence was the natural stage, and since the beginning of civilization brigandage has prevailed wherever natural, political, and economic conditions have united to make peaceful pursuits difficult and unremunerative, and plunder profitable. Given a country of mountains, desert, or marshes, a poverty-stricken peasantry oppressed by alien masters, a period of civil war and anarchy, and brigandage is sure to spring up. Countries like Arabia, where man has in great part remained in a state of nature, are still the homes of bands, or even clans and entire nations of robbers. In Ancient Greece highway robbery flourished as a survival of prehistoric times. One of Theseus's great labors was clearing the Corinthian Isthmus of the brigands that infested it. In distinction from his forefathers, the modern Greek bandit is the product of just such conditions as have been pronounced favorable to the growth of outlawry. Greece before 1827 presented the spectacle of a country impoverished by the anarchic rule of the Turk. The mountains and ravines of Hellas became the home of the Greek *Klephs*, who were raised above the common level of brigands by the national spirit which at times animated them, elevating them to the rank of heroes. The names of Marco Bozzaris and Colocotronis, and other leaders of the *Klephs*, are well known in connection with the Greek War of Liberation.

Rome was founded by outlaws, and during the social and civil wars the Italian Peninsula was a stamping ground for bands of renegade soldiers, runaway slaves, and gladiators, who were often bold enough to enter the suburbs and towns, plundering tombs and deserted houses, kidnapping and assassinating for pay. The spurs of the Apennines and the marshes of the Campagna afforded them safe retreats and admirable centres of operation. The splendid military roads of Rome were not safe from them.

Britain had her Hereward (c1060) and her Robin Hood (c1170), with his Merry Men of Sherwood, the last champions of Saxon England against the Norman. The clearing of the forests, the draining of the fens, the repression of the lawless barons by the crown, made systematic brigandage impossible. Though it flourished in Scotland, in Wales, and on the border, the craft died out in England. Jack Sheppard (1702-24) and Dick Turpin (died 1730) are brilliant but solitary phenomena. France, likewise, was too firmly governed after 1600 to suffer the existence of powerful robbers, though the country had been devastated by them during the Hundred Years' War and the Civil wars. Still, France may boast of two great

names in modern times: Cartouche (1693-1721), who terrorized Paris for a long period, and Mandrin (1724-55), whose sphere of operations lay south of the Loire and chiefly in Languedoc. The robber barons of Germany are historic. They swarmed in the southwestern part of the country, on the Rhine, and in what is now Bavaria, Württemberg, and Baden. The great cities of southern Germany, Nuremberg, and Augsburg especially, suffered greatly from their depredations and carried on feuds with them. Maximilian I (died 1519) did much to crush out these predatory knights by putting them under the ban and proclaiming a general peace for the Empire. They disappeared before the power of the consolidated principalities after the Thirty Years' War. About the time of the French Revolution Johann Buckler, apprenticed to a hangman, ran away and set up for himself as brigand, in the Rhine Provinces. "Schunderhannes," as he was generally called, was absolutely fearless and frequently captured bands of travelers single-handed, though he commanded more than 100 men. He was executed at Metz in 1803. Spain has always been a land of outlaws. The system of imposing extravagant imposts on foreign and domestic trade, which has always been followed, made smuggling immensely profitable, and the country was consequently filled with bands of contrabandists, who plundered and murdered when they could not smuggle. From 1808 to 1876, moreover, Spain was at various times the scene of guerrilla warfare; the nation against Napoleon, Liberals against Absolutists, and Cristinos against Carlists. In such stormy times freebooters naturally thrive. The most famous of Spanish outlaws is probably Don José María, best known, no doubt, as the hero of Prosper Mérimée's *Carmen*.

Italy, in modern times, has been the stronghold of brigandage, because the conditions necessary for the existence of brigandage have prevailed there in the most developed form. During 400 years the country served as a toy for European nations and was repeatedly torn up and patched together to suit the designs of European diplomacy. In southern Italy especially, the people were reduced to misery, deprived of all semblance of wise and stable government, and subjected to foreign masters. Naples was a flourishing country in the sixteenth century when Spain took possession of it. Spanish tyranny and maladministration crippled the country's resources, stifled its political life, and drove its bold and active spirits to the mountains. The period of the French Revolution was the golden age of brigandage, when Italy supplied the world with its most daring criminals, and operative compositors with picturesque subjects for their librettos. Then rose Fra Diavolo (q.v.), bandit and monk, hanged in 1806 by the French, against whom he maintained the cause of the Bourbons; Peter of Calabria (c.1810), who proclaimed himself "Emperor of the mountains, King of the forests, Protector of the highways"; the priest, Cirro Annochiarso, who said to the Father who came to give him absolution before his execution for numerous bloody crimes, "No tomfoolery. We are both in the business"; Marco Sciavo; Crocco; and many others. The Bourbon uprising in 1860 filled southern Italy with armed bands of partisans, who degenerated into banditti and were stamped out only after hard campaigning. The peninsula of Italy is at present almost cleansed of the pest, but in Sicily

it rages as violently as ever. The Sicilian outlaws hold the country in subjugation and live in open alliance with the peasantry and the officials. In Sicily, too, the evil of secret societies is prominent, the Mafia finding its home there. The Mafia dates back to the time of the Norman invaders, when the enslaved people were ruled by the foreign barons, who neither granted them justice nor afforded them protection. A state of things which made possible a murderous uprising like the Sicilian Vespers (q.v.) brought about the formation of secret societies among the peasants, organized for their mutual protection. Knowing what justice they were likely to obtain in the lord's court, they pledged themselves never to appeal to the authorities, but to leave all causes to be decided by the society. Continued misgovernment confirmed the peasant in his views, and to the present day he regards all authority and the machinery of government with distrust, and looks upon the Mafia as a national institution, and upon the brigands as victims of oppression. The fact that the society has lost its original character, and that the brigands are mere criminals, does not prevent the Sicilian from holding secret obedience to the one and paying tribute to the other.

Other nations have had, and still have, their bandits. The Kabyles of the Atlas Mountains, the Kurds of Armenia, and the Hillmen of Afghanistan and India are subjects of contemporary interest. Russia, in the seventeenth century, brought forth a great brigand—Stenko Razin, a Cossack, who ravaged the valleys of the Don and the Volga and the shores of the Caspian. In 1670 he headed an insurrection of the serfs in southeastern Russia, took the towns of Astrakhan, Saratov, and Samara, and devastated the country around Nizhni-Novgorod and Tombov. He was defeated in 1671, captured, and executed.

The type of brigandage combining patriotism with plunder as practiced in the Balkan States received a remarkable illustration in the last part of 1901 and the spring of 1902. On Sept. 3, 1901, as Miss Ellen M. Stone, a missionary at Bansko, in Macedonia, was traveling through the mountains, accompanied by a native woman and an escort of seven men, the party was attacked by brigands, and Miss Stone and her companion, Madame Tsilka, were carried off, while the others were sent on to Samakov to tell of the capture and to state that a ransom of \$110,000 was demanded for the release of the women. It soon became evident that the party which had captured Miss Stone were no mere brigands, but were acting as the agents of the Macedonian Committee, whose object is to free their country from the Turkish rule and who resorted to this means to secure the funds necessary for carrying on their agitation. Efforts to run down the brigands proved fruitless, and finally the United States government was forced to treat with them through its diplomatic representatives in Turkey. On February 6 a ransom of \$72,000 was paid, and on February 23 Miss Stone and her companion were set at liberty near Strumitza, not far from the place where they had been captured. The good character of the brigands was attested by the released women, who declared that they had been treated with all kindness and consideration consistent with the relation of captors and prisoners.

The United States has its share to add to the

history of brigandage Following the discovery of gold in California in 49, a succession of bandit bands, recruited largely from among the expatriated Mexicans, ravaged the mining camps and postal and express routes for many years. Other bands sprang up to the east of the Rockies, mauling and robbing until suppressed or exterminated by vigilance committees. The

"Wild Bunch," with its headquarters in the Big Horn Mountains in Wyoming, was one of the most notable of these. It began its operations in the days of stagecoaches and with the coming of the railroad became a band of train robbers. The last member of the gang was finally killed only in 1903. Jesse James, train robber from 1870 to 1881, was probably the most daring, certainly the most famous, of American bandits. His exploits have been made the subject of many stories and are as famous in England as in the United States. These names seem already to belong to a long-past age, and yet to-day records of fresh train robberies are still coming in from some of the less prosperous Southern States. Brigandage in the United States is dying out, as economic and political conditions offer steadily less occasion for it.

Mexico, with its unsettled government, is, and probably will be for some years to come, the centre of the brigandage of America.

Bibliography. Nicotri, *Mafia e brigantaggio in Sicilia* (Rome, 1900); McFarlane, *Lives and Exploits of Banditti and Robbers* (London, 1837). For an interesting account of an American bandit, consult Irwin and Jennings, *Beating Back* (New York, 1914).

BRIG'ANDINE, or BRIG'ANTINE (from *brigand*, a foot soldier, later brigand). In armor, an assemblage of small plates of iron, sewed upon quilted linen or leather and covered with a similar substance forming a sort of coat or tunic. It was lighter than the corselet, more effective than the hauberk, and cheaper than either, so that it came into common use. The brigandine was named from the brigands, a light-armed, irregular soldiery of the fourteenth and fifteenth centuries, resembling the Turkish Kurds and Bashi-bazouks of recent days, and, like them, addicted to marauding and pilfering, hence the English word "brigand." It did not come into use until the fifteenth century.

BRIGANTINE. See BRIG.

BRIGANTIUM. See BRIANCON.

BRIGGS, CHARLES AUGUSTUS (1841-1913). An American theologian. He was born in New York City, Jan. 15, 1841, studied at University of Virginia, graduated at Union Theological Seminary, New York, 1863, studied at University of Berlin, Prussia, 1866-69, and was ordained (Presbyterian) 1870. He was pastor at Roselle, N. J., from 1870 to 1874, professor of Hebrew and cognate languages in Union Theological Seminary, New York, 1874-91, and subsequently professor of biblical theology in the same institution. His inaugural address on taking this latter chair (Jan. 20, 1891), on *The Authority of the Holy Scriptures*, contained statements respecting the Bible, inspiration, and the place of reason in religion which were the subject of charges for heresy before the Presbytery of New York, which, however, after a six weeks' trial, acquitted him (December, 1892). Those who were dissatisfied with this verdict brought his case before the General Assembly of the Presbyterian church in May, 1893, and by that body he was suspended from the minis-

try, but the Seminary refused to remove him. He entered the ministry of the Protestant Episcopal church in 1897. He was the author of *Biblical Study* (1883), enlarged and rewritten, and entitled *General Introduction to the Study of Holy Scripture* (1899), *American Presbyterianism Its Origin and Early History* (to 1775), together with an appendix of letters and documents which have recently been discovered (1885), *Messianic Prophecy A Study of the Messianic Passages of the Old Testament* (1886), *Whither? A Theological Question for the Times* (1889), *The Bible, the Church, and the Reason* (1892), *The Higher Criticism of the Leviteuch* (1893), *The Messiah and the Gospels* (1894), *The Messiah of the Apostles* (1895), *General Introduction to the Study of Holy Scripture* (1899), *The Incarnation of the Lord* (1902), *New Light on the Life of Jesus* (1904), *The Ethical Teaching of Jesus* (1904), *A Critical and Exegetical Commentary on the Book of Psalms*, with Emily Grace Briggs (2 vols., 1906-07), *Church Unity* (1909), *The Fundamental Christian Faith* (1913), *Theological Symbolics* (1914). He was one of the authors of *The New Hebrew Lexicon* (1906) and one of the editors of two important series of books, *The International Theological Library* and *The International Critical Commentary*.

BRIGGS, CHARLES FREDERICK (1804-77). An American journalist and author, well known under the pseudonym of "Harry Franco." He was born at Nantucket, Mass. In 1844 he started at New York the *Broadway Journal*, of which in the following year Edgar Allan Poe became associate editor. His next important editorial work was on *Putnam's Magazine* (1853-56) in connection with George William Curtis and Parke Godwin. Later he served on the *Times*, the *Evening Mirror*, the *Brooklyn Union*, and, finally, the *Independent*. His *Harry Franco A Tale of the Great Panic* (1839) was followed by a series of works dealing more or less humorously with life in New York City.

BRIGGS, FRANK OBADIAH (1851-1913). An American legislator, born in Concord, N. H., and a graduate of the United States Military Academy. In 1877 he resigned from the army and began service with John A. Roebling's Sons Co., of which he was assistant treasurer from 1883 until his death. He was mayor of Trenton, N. J., in 1899-1902, State Treasurer in 1902-07, and United States Senator in 1907-13. He failed of reelection in 1912. For the last nine years of his life he was chairman of the Republican State Committee of New Jersey.

BRIGGS, GEORGE NIXON (1796-1861). An American lawyer and politician. He was born in Adams, Mass., was admitted to the bar in 1818, and soon attained great prominence as a criminal lawyer. He served in Congress from 1831 to 1843 and as Governor of Massachusetts from 1844 to 1851. He was subsequently a judge of the Common Pleas (1851-56), was one of the founders of the Republican party in his State, and for 16 years was a trustee of Williams College. Consult Richards, *Great in Goodness* (Boston, 1866).

BRIGGS, HENRY (1561-1631). An English mathematician, born at Warley Wood, in Yorkshire. He received his education at Cambridge, where he became examiner and lecturer in 1592. In 1596 he was made professor of geometry in the newly founded Gresham College, London, and in 1610 was invited to fill the chair of

astronomy at Oxford, but resigned this position in 1620. Briggs made a number of interesting contributions to mathematics and astronomy, but he is justly celebrated for his invention of the ordinary decimal system of logarithms. In 1616 he went to Scotland to see Napier, with whom the general idea of logarithms had originated some time previously. "My Lord," he said to Napier, "I have undertaken this journey purposely to see your person, and to know by what engine of wit or ingenuity you came first to think of this most excellent help unto astronomy, viz. the logarithms, but, my Lord, being by you found out, I wonder nobody else found it out before, when now known it is so easy." (Lilly, *History of his Life and Times*.) Briggs devoted many years of his life to the calculation of logarithmic tables, his system being still known as Briggs's Logarithms. His published works include: *Logarithmorum Chilias Prima* (1617); *Lucubrations et Annotations in Opera Posthuma J. Neperi* (1619); *Arithmetica Logarithmica* (1624); *Trigonometria Britannica* (1633). See LOGARITHMS.

BRIGGS, LYMAN JAMES (1874-). An American physicist, born at Assyria, Mich. He was educated at Michigan Agricultural College, the University of Michigan, and Johns Hopkins. In 1896 he took charge of the Physical Laboratory Division (now Bureau) of Soils in the United States Department of Agriculture, and in 1906 he became the physicist in charge of the Physical Laboratory of the Bureau of Plant Industry. His investigations published as bulletins of the Department of Agriculture include the following: *The Mechanics of Soil Moisture* (1897); *The Centrifugal Method of Soil Analysis* (1904); *The Moisture Equivalents of Soils* (1907); *Dry Farming in Relation to Rainfall and Evaporation* (1910); *The Wilting Coefficient for Different Plants and its Indirect Determination* (1912).

BRIGHAM, brig'am. A city and the county seat of Box Elder Co., Utah, 21 miles north of Ogden, on the Oregon Short Line and the Southern Pacific railroads (Map: Utah, B 1). It contains a public library and a trout hatchery. The city is engaged principally in fruit growing, being especially noted for its peaches, and has canning and cement factories, planing mills, and lumber yards. The water works and electric light plant are owned and operated by the municipality. Pop., 1890, 2139; 1900, 2859; 1910, 3685.

BRIGHAM, ALBERT PERRY (1855-). An American geologist, born at Perry, N. Y. He was educated at Colgate College, Hamilton Theological Seminary, and Harvard University. Having been ordained to the Baptist ministry, he held pastorates at Stillwater, N. Y. (1882-86), and Utica, N. Y. (1885-91). In 1892 he became professor of geology at Colgate, was for several years instructor in the Harvard Summer School of Geology, professor in the Cornell Summer School (1901-04), professor at the University of Wisconsin (1906), and lecturer at Oxford University School of Geography (1908). Besides having been editor of the *Bulletin of the American Geographical Society*, he is author of *A Text-Book of Geology* (1900); *Geographic Influences in American History* (1903); *Student's Laboratory Manual of Physical Geography* (1904); *From Trail to Railway through the Appalachians* (1907); *Commercial Geography* (1911).

BRIGHAM, AMARIAH (1798-1849). An American physician, who devoted much attention to the study of insanity. He was born in New Marlboro, Mass., and was eminent as a physician in that State and at Hartford, Conn., where he became superintendent of the retreat for the insane in 1840. Two years later he accepted a similar post at the New York State Asylum in Utica, N. Y. Dr. Brigham regarded infant schools and religious revivals as frequent inducers of insanity, and published his views in *Influence of Mental Cultivation on the Health* (1832) and *Influence of Religion upon the Health and Physical Welfare of Mankind* (1835). He also established the *Journal of Insanity* and published *Treatise on Epidemic Cholera* (1832) and *Diseases of the Brain* (1836).

BRIGHAM, WILLIAM TUFTS (1841-). An American ethnologist and museum director, born in Boston. After graduating from Harvard, he investigated the botany of the Hawaiian Islands in 1864-65, was for several years an instructor at Harvard, and while a member of the Boston school board brought about the introduction of art instruction in the public schools. In 1888 he became director of the Bishop Museum of Ethnology in Honolulu. His publications include: *Cast Catalogue of Antique Sculpture* (1874); *Guatemala, the Land of the Quetzal* (1887); *Hawaiian Feather-Work* (1890); *Mats and Baskets of the Ancient Hawaiians* (1906); *Ancient Hawaiian House* (1908); *Ka Hana Kapa (Bark Cloth Making)* (1911).

BRIGHAM YOUNG UNIVERSITY. A coeducational institution under control of the Latter Day Saints at Provo, Utah. It was founded by a deed of trust executed by President Brigham Young in 1875. It has collegiate, normal, and high-school departments. The total enrollment in all departments in 1913 was 650; the faculty numbered 30. There were about 6000 volumes in the library. President, George H. Brimhall.

BRIGHELLA, brèg'èl'la (It. dim. of *briga*, strife, quarrel, brawl). A rustic clown; one of the conventional types in old Italian comedy.

BRIGHOUSE. A town in the West Riding of Yorkshire, England, on the Calder, about 3 miles east-southeast of Halifax (Map: England, E 3). It is composed of the districts of Brighouse, Rastrick, and Hove Edge, which were incorporated in 1893 as a borough. Its water is supplied by the corporation of Halifax. The town owns gas and electric light plants, markets, a free library, art gallery and museum, a sewage-disposal works, and cemeteries. Its industries consist of the manufacture of woolen, worsted, and silk fabrics. There are also machine works and stone quarries. Pop., 1891, 20,666; 1901, 21,735; 1911, 20,843. Consult Turner, *History of Brighouse* (Bingley, 1893).

BRIGHT, SIR CHARLES TILSTON (1832-88). An English engineer, born at Wanstead. In 1852 he became connected, in the service of the Magnetic Company, with the laying of underground systems of land telegraphy. He took out patents on telegraphic apparatus and in 1856 was appointed engineer in chief to the Atlantic Cable Company. After two failures he at length succeeded, on Aug. 5, 1858, in laying the 2050 miles of cable connecting Ireland and Newfoundland. (See ATLANTIC TELEGRAPH.) He was thus the first to establish communication by telegraph between America and Europe. Subse-

quently he was employed in the laying of cables in the Mediterranean Sea, in the Persian Gulf, and among the West Indies. From 1865 to 1868 he represented Greenwich in Parliament as a Liberal, and in 1866-67 was president of the Institute of Electrical Engineers. With Latimer Clark he invented a method for the application of a composition of asphalt as a coating for the exterior of submarine cables.

BRIGHT, JAMES FRANCK (1832-) An English scholar, educator, and author. He was born at St. James's, Westminster, graduated in 1855 at University College, Oxford, and from 1856 to 1872 was an assistant master at Marlborough College. In 1872 he became tutor and lecturer in modern history and divinity at Balliol, and lecturer in modern history at University College. Of the latter, he was in 1874 appointed dean, and from 1881 to 1906 was master. He was repeatedly examiner in history at the university. He published a textbook, *History of England to 1901* (5 vols., 1884-1904), and lives of Joseph II and Maria Theresa, both in 1897.

BRIGHT, JAMES WILSON An American philologist, educated at Lafayette College and at Johns Hopkins (Ph D., 1882). By the latter institution he was appointed associate professor of English philology (1891), professor (1893), and professor of English literature (1905). Prominent in the movement for "spelling reform," like his teacher March at Lafayette, he became a vice president of the London Simplified Spelling Society. He edited *Anglo-Saxon Reader, with Outlines of Grammar* (1891), *The Gospel of St. Luke in Anglo-Saxon* (1893), and, in West Saxon, *St. Matthew* (1904), *St. John* (1904), *St. Mark* (1905), *St. Luke* (1906), and, with other editors, *The Psalms* (1907). He collaborated with R. D. Miller on *Elements of English Versification* (1910), and with G. L. Kittredge edited *The Albon Series of Anglo-Saxon and Middle English poetry* (1906 et seq.). He was also chosen an editor of the *Notes of the Modern Language Association*.

BRIGHT, JESSE D. (1812-75) An American politician. He was born in Norwich, N. Y., but removed with his parents to Indiana in 1820, was admitted to the bar in 1831, and was successively a member of the State Legislature, Lieutenant Governor of the State, and United States Marshal. In 1845 he was elected to the United States Senate and thereafter on several occasions was chosen as its President pro tem. He was an enthusiastic Democrat and in all sectional disputes consistently voted with the South against the North. In 1862 the Republicans brought against him a charge of disloyalty, which was based largely on his having written to "His Excellency Jefferson Davis, President of the Confederation of States," a letter introducing a friend who had an "improvement in firearms" to dispose of, and though the Judiciary Committee decided that such evidence as had been adduced was insufficient for conviction, nevertheless he was expelled from the Senate by a vote of 38 to 14. He subsequently went to Kentucky, where he was elected to the State Legislature, and in 1874 he removed to Baltimore, Md.

BRIGHT, JOHN (1811-89) An English statesman and orator. He was the son of Jacob Bright, a Quaker cotton spinner and manufacturer at Rochdale, Lancashire, and was born at Greenbank, near that town, Nov. 16, 1811. Young Bright's education was of a fitful and elementary character, and the magnificent attainments which

he displayed in later life must be ascribed entirely to native talent and to indefatigable industry. At the age of 15 he entered his father's business, but devoted himself at the same time to the study of public oratory, which seems to have attracted him at a very early period. In 1835 he made a foreign tour, which included a journey to Palestine. On his return he delivered a number of lectures on the subject of his travels and on topics connected with commerce and political economy before the Literary Society of Rochdale, of which he was one of the founders. As a manufacturer, and as a believer in the orthodox political economy of his day, Bright opposed determinedly the humanitarian efforts of the Tory Socialists (qv) to stamp out the evils of child labor. His remedy for the horrible conditions within the English factory was to repeal the corn laws and to inaugurate free trade—a remedy which, be it noted, the manufacturers embraced with the more enthusiasm inasmuch as it entailed hardships upon the landowners alone, while at the same time it exempted themselves from all responsibility. In 1839 he was one of the founders of the first Anti-Corn Law Association at Manchester, at which time he made the acquaintance of Richard Cobden, with whom he lived in close friendship till the latter's death. Bright, however, did not actively enter into the Anti-Corn Law agitation until 1841, but from that time until the repeal of the laws in 1846, he and Cobden were the most prominent leaders of the movement, and Bright continued, by the side of Cobden, to be one of the chief pillars of the general system of free trade, which obtained such complete ascendancy in England. Bright's power consisted in his talent for forceful presentation, which made him an excellent popular exponent of the principles formulated by finer thinkers, like Cobden. In 1843 Bright was elected to Parliament from Durham, and four years later from the factory town of Manchester, for by this time he had come to be regarded as one of the leaders of English workmen. After 1857 he sat for Birmingham. In Parliament Bright, though initiating no important measures of legislation himself, exercised a very powerful influence on the most important features of Imperial policy. He showed himself an ardent champion of the rights of the people of India, in their defense he antagonized the East India Company, and he was largely instrumental in bringing India under the direct control of the crown. He also lent much attention to the Irish question. He was a warm advocate of the disestablishment of the Irish church and to the end of his life was interested in the various Irish land measures. He remained a leader of the Liberal party throughout his life, playing a great part in the movement which led to the Reform Bill of 1867, and, in a somewhat less degree, in the agitation preceding the County Franchise Bill of 1884. He held office under Gladstone as President of the Board of Trade from 1868 to 1870, and as Chancellor of the Duchy of Lancaster from 1873 to 1874 and from 1880 to 1882. In 1883 he was made Lord Rector of Glasgow University. He died March 27, 1889.

The enormous influence which Bright exercised on English politics and public opinion during the greater part of his life was due in less measure to his intellectual attainments than to his power as an orator. Aside from the gift of oratory, which, according to competent crit-

ies, he possessed to a degree unequalled by any other English statesman of the nineteenth century, Bright impressed himself upon Parliament, and more than that, upon the people at large, by the intense earnestness, the hatred of injustice, and the disinterested sympathy for the oppressed which he displayed at all times. He has been characterized as having had in him something of the austerity of the ancient Hebrew prophets, and he certainly spoke like one who brings his religion into his politics. Though called the "Tribune of the People," he never feared to antagonize public opinion whenever that opinion was out of conformity with his rigid standards of duty and right. Thus, being in general opposed to all war (as a result no doubt of his Quaker origin), he dared to advocate peace with Russia in 1854 at a time when the war fever was at its height; and again, in 1877-78, he stood opposed to British intervention in Russo-Turkish affairs. To America, especially, Bright rendered services of inestimable value during the period of the Civil War, in that he was undoubtedly the most prominent among the very few notable men, in Parliament or out, who advocated the cause of the North against the South; and that, too, in spite of the fact that the continuance of the war was disastrous to his own interests as a cotton spinner and to the entire Lancashire cotton trade. But his moral power was most clearly shown in the period after the conversion of the Liberal party to Home Rule in 1885. Mr. Bright, regarding such a policy as vicious, refused to follow his old leader, Gladstone, and did not hesitate to denounce openly the "unholy alliance," as he considered it, of the old Liberal party with the Parnellites, although to him this meant the breaking up of ancient personal and political ties which effectually saddened the last years of his life. A collection of Bright's speeches was published at London in 1898 and his *Public Letters* in 1895. Consult: Barnett-Smith, *Life and Speeches of John Bright* (New York, 1881); Robertson, *Life and Times of John Bright* (London, 1902); Trevelyan, *The Life of John Bright* (London, 1913).

BRIGHT, RICHARD (1789-1858). An English physician, born in Bristol. He was educated at Edinburgh, London, Berlin, and Vienna, and after 1820 was connected with Guy's Hospital, London. He conducted many important investigations in the field of pathological anatomy and was the first to discover the true nature of the disease since known by his name. (See **BRIGHT'S DISEASE**.) He published *Original Researches into the Pathology of Diseases of the Kidney* (1827), and a book of *Travels through Lower Hungary* (1818), which contains a valuable account of the gypsies.

BRIGHT, WILLIAM, D.D. (1824-1901). An English Church historian. He was born at Doncaster, England, Dec. 14, 1824, and was educated at Rugby and University College, Oxford. He was ordained a priest in 1850, and for nine years was a theological tutor at Trinity College, Glensmond. Returning to Oxford as tutor, he became in 1868 canon of Christ Church and regius professor of ecclesiastical history. He published editions of several Church fathers. Among his numerous original works may be mentioned: *History of the Church, from the Edict of Milan to the Council of Chalcedon* (1860); *Chapters of Early English Church History* (1878); *Notes on the Canons of the First*

Four General Councils (1882); *The Roman See in the Early Church* (1896); *Some Aspects of Primitive Church Life* (1898). He died at Oxford, March 6, 1901.

BRIGHTENING. In calico printing, the operation of rendering the colors of printed fabrics more bright or brilliant by treating them in solution of soda, acids, or other materials.

BRIGHTLY, FREDERICK CHARLES (1812-88). An American lawyer, born at Bungay, Suffolk, England. He came to America in 1831, studied law, was admitted to the bar in 1839, and from 1870 was wholly occupied with legal authorship. His collection of 5000 volumes was considered one of the best private law libraries in the United States. His many compilations include: *Law of Costs in Pennsylvania* (1847); *A Digest of the Decisions of the Federal Courts* (2 vols., 1868-73); *Leading Cases on the Law of Elections* (1871); *A Digest of the Decisions of the Courts of the State of New York to January, 1884* (3 vols., 1875-84).

BRIGHTON, br'v-ton (originally *Brightelmstone*, named after an Anglo-Saxon bishop, *Brightelm*, who was supposed to have founded it in the tenth century, + *town*). A town and celebrated seaside resort, styled "London by the Sea" and "The Queen of Watling Places" in Sussex, England, on the English Channel, 51 miles south of London (Map: England, F 6). It is built on a slope ascending eastward to a range of high chalk cliffs bounding the coast as far as Beachy Head; to the west these hills recede from the coast and leave a long stretch of sands. It extends from Kemp Town on the east to Hove on the west. The town has suffered severely at various periods of its existence through inroads of the sea, and to guard against further encroachments, a great sea wall has been built; further protection is furnished by numerous jetties projected seaward. A fine promenade, called the Front, the largest seaside promenade in Great Britain, extends along the sea front for 4 miles. Brighton is well built and possesses many handsome buildings, among them being several palatial hotels. Near the centre of the town is the Royal Pavilion, a fantastic Oriental or Chinese structure, with domes, minarets, and pinnacles, built for the Prince of Wales (afterward George IV) and acquired by the town in 1850. It contains assembly rooms, a museum, picture galleries, etc. The Dome, formerly the Royal Stables, also acquired by the town, has been turned into a magnificent concert hall. The aquarium is world-famous, and the Booth Museum (bequeathed to the town in 1890 by E. T. Booth) contains the finest collection of British birds in existence. There are numerous theatres and music halls.

Brighton obtained its charter of incorporation in 1854. It sends two members to Parliament. The town owns its excellent water supply, as well as its electric light plant, which yielded in 1909-10 a profit of about \$300,000. Among other municipal undertakings are an electric street-car service, public baths, markets, and slaughterhouses. The town has numerous parks and public race grounds. In addition to its numerous private schools, the town has a municipal school of science and technology, and one of art, a grammar school, and a public library. Brighton has no maritime trade. It is essentially a town for recreation and sea bathing. There are several hospitals, including one for children, a blind and a deaf-and-dumb asylum.

An electric street railroad connects Brighton with Kemp Town, and an electric shore road (overhead trolley) with Rottingdean Pop, 1891, 115,873, 1901, 123,478, 1911, 131,250 Brighton was an important place in the sixteenth century, when it was twice ravaged by the French. The sea, however, now covers the ground where old Brighton once stood.

Consult Sicklemore, *History of Brighton* (Brighton, 1827), Sawyer, "Old Brighton," in *Archæological Journal*, vol. xlii (London, 1886), "Progress of Brighton," in *Municipal Journal* (London, 1899), Melville, *Brighton Its History, its Folks, and its Fashions* (London, 1909).

BRIGHT'S DISEASE The common name for *nephritis*, or disease of the kidneys. It takes its name from Dr. Richard Bright (q.v.), an English physician, who in 1827 first recognized and described renal disease and properly attributed to it the symptoms and the changes in the urine which it causes. The term is not distinctive, for it includes several forms of *nephritis*. For clinical purposes diseases of the kidneys are classified according to the nature of the morbid process existing, whether it be congestion, degeneration, or inflammation. These processes are attended by accumulation of blood in veins and capillaries of the kidneys, changes in their blood vessels and tissues, formation of new tissue and death of tissue, with resulting local and general symptoms and disturbances of function. We have, then, acute and chronic congestion of the kidney, acute and chronic degeneration of the kidney, acute and chronic exudative *nephritis*, acute productive *nephritis*, chronic *nephritis*, without exudation, suppurative *nephritis*, and tubercular *nephritis*. There are many synonymous names for these diseases. The *causes* of *nephritis* may be as follows: (1) prolonged exposure to cold, (2) poisons, such as alcohol, turpentine, cantharides, lead, arsenic, mercury, as well as the toxins produced during yellow fever, scarlet fever, gout, syphilis, suppuration, tubercle, cancer, etc., (3) mechanical obstruction to the circulation, such as heart disease and pleurisy with effusion. The *symptoms* of *nephritis* differ. In acute *nephritis* the patient may have merely slight headache, pain in the back and in the legs, loss of appetite and nausea, or he may have fever, prostration, stupor, twitching, shortness of breath, and convulsions. The urine generally contains albumen and casts, and there may be dropsy of the legs. In the chronic forms of the disease the symptoms are less severe, though shortness of breath, severe headache, anæmia, and dropsy generally predominate. In the *treatment* of *nephritis* physicians generally recommend frequent change of scene and climate, reduction of sugars and starches and increase of fats in the diet, abstinence from alcoholic beverages and from tobacco, and life in the open air. Drugs are of much less value.

Pathology In *acute congestion* the kidneys are swollen and darker than normal, the vessels containing an increased amount of blood. There may be flattening of the tubules from pressure and exudation into them. In *acute degeneration* the kidney is usually somewhat enlarged, it may be congested, and the cortical portion is often swollen and pale. The cells of the kidney tubules are swollen and granular and show various stages of disintegration, up to complete destruction of the cells. Within the tubules are fat globules, coagulated albumen, and gran-

ular matter, resulting from degeneration of the epithelium. In *acute exudative inflammation* the condition of the kidneys varies greatly. There may be simply congestion, with inflammatory products in the tubules. The kidney may be enlarged and congested, the cortex, thick, pale, and wet. The epithelium of the tubules is apt to be swollen or flattened by the exudate or disintegrated, and there are collections of white blood cells scattered throughout the cortex. In the lumina of the tubules are masses of coagulated albumen, casts (either clear or containing red or white blood cells), and the products of cellular disintegration. In the glomeruli of the kidneys there is a thickening of the capsule epithelium and of the cells lining the capillaries, so that the outlines of the capillaries disappear. There is often an accumulation of coagulated albumen and detritus within the cavity of the glomerulus. In *acute productive inflammation* the kidneys are increased in size, the surface smooth, and the capsule non-adherent. An acute exudative inflammation such as has just been described is usually present, but added to this is an increase in the connective tissue elements of the kidney, with consequent atrophy of the tubules. There may be extreme proliferation of the capsule cells of the glomeruli. The kidneys remain permanently damaged organs.

In *chronic congestion* the kidney is somewhat enlarged, heavy, hard, of dark-red color, the surface smooth, and the capsule non-adherent. The epithelial cells of the tubules may be swollen, and in the glomeruli the capillaries are distended, with thickening of their walls. In chronic degeneration, due to heart disease, the kidneys are usually large and white, the cortex being thickened. The epithelium of the tubules is swollen and granular, and in the glomeruli the capsule cells are distended. In the degeneration which occurs in wasting diseases the changes in the glomeruli are apt to be absent, while in senile degeneration the kidney may be either large and white, or small, red, and atrophied, with changes in the epithelium of the tubules, but no change in the glomeruli. In *chronic diffuse inflammation with exudation*, or *chronic parenchymatous inflammation*, the appearance of the kidney varies greatly. It is usually enlarged, more rarely it is of normal size or small. Its surface may be smooth or nodular. The cortex may be thickened and white, or mottled. The epithelium of the tubules may be flattened by exudate, or swollen and granular. Some tubules are of normal size, others are dilated, while still others are compressed by the new connective tissue. Within the lumina are coagulated albumen, disintegrated epithelium, and red and white blood cells. In the glomeruli there is an increase in the connective-tissue elements with atrophy, and the capillaries may show waxy degeneration. There is an increase in the interstitial connective tissue of the kidney, but it is not extensive. The arteries often show increased thickness of walls. In *chronic diffuse inflammation*, without exudation, or *cystic* of the kidney, the kidney is apt to be small, its surface rough, and its capsule adherent. The increase in connective tissue is the most marked feature. Dependent upon or determining this increase in connective tissue is atrophy of the tubules and of the glomeruli. The tubules are sometimes greatly swollen and form casts. The blood-vessel walls are usually thickened, and the capillaries of the glomeruli

may show waxy changes. Consult Osler, *Principles and Practice of Medicine* (New York, 1912). See ALBUMINURIA; KIDNEY.

BRIGITTINES, brî'tî-tînz, or ORDER OF OUR SAVIOUR. An order founded in 1346, as a branch of the Augustinians, by St. Bridget, or Brigitta, of Sweden. It took in both men and women. The first monastery, which was also the mother house of the order, was on the founder's estate at Vadstena, on the eastern bank of Lake Vättern, southwest of Stockholm. At the other houses of the order the monks and nuns inhabited contiguous buildings, but never saw each other, and each sex governed its own affairs. Their occupations were largely literary, and they prepared Swedish translations of religious works, mostly of evangelical tendency. The order spread through Scandinavia and Finland, also into Holland, Germany, Italy, and Spain. Henry V (1413-22) introduced it into England and founded Sion House, near Brentwood, 7½ miles west of London. Henry VIII suppressed it, with other religious orders. Mary reestablished it, but Elizabeth again suppressed it. The nuns then went to Portugal and opened their house in Lisbon. In 1861 some of their successors came back and opened a house in Spetisbury, Dorsetshire. Later on it was moved to its present site, Chudleigh, near Exeter. In Sweden the order had so firm a hold that the mother house was not suppressed till 1595, when most of the houses outside had ceased to exist. The order was revived in Belgium as Brothers of the Revised Brigittine Order, and in Spain as Nuns of the Order of St. Bridget, and there it has now five convents. Only four convents of the original order now are found—one in Bavaria, at Altmünster, two in Holland, and the one mentioned in England. For the history of the order in Sweden, consult *Scriptores Rerum Suevicarum Medii Aevi*, vol. i (Stockholm, 1871); also *History of the English Brigittine Nuns* (Plymouth, 1886), and Steele, *Story of the Brigittines* (New York, 1911). The Basel reformer Geolampadius was a Brigittine monk.

BRIGLIADORO, bré'lyá-dô'rô (It. from *briglia*, bridle + *d'* = *di*, of + *oro*, Lat. *aurum*, gold). The name given to Orlando's steed in Boiardo's *Orlando Innamorato*, on account of the splendor with which he was bridled.

BRIGNOLES, bré'nyô'l'. The capital of an arrondissement in the department of Var, France, on the Calami, 22 miles southwest of Draguignan (Map: France, S, I 5). It is picturesquely situated in a fertile valley, surrounded by forest-clad hills, and has some fine old buildings. The palace of the counts of Provence is occupied by the prefecture; the Templars' house is now a theological seminary. Brignoles has tanneries, potteries, silk, woolen, and cloth manufactures, and a trade in brandy, wines, prunes, and olives. The town was known as Villa Puerorum in connection with the rearing of the children of the counts of Provence. It was captured and sacked by Charles V in 1524 and by the Leaguers in 1628. Pop., 1901, 3904; 1911, 3692.

BRIGNOLI, bré-nyô'lé, PASQUALE (1824-84). An Italian tenor, born in Naples. He received an excellent musical training, at first in piano and later in singing. He appeared with great success in concert and opera, in Paris, London, and the principal cities of Europe; then came to the United States, under Strakosch, in

1855, and for a quarter of a century was one of the most popular operatic tenors. He sang with Patti at her début and appeared with all the great singers of his time—Parepa-Rosa, La Grange, Tietjens, and Nilsson among them. Brignoli's voice was a true tenor of beautiful quality, great carrying power, and wonderful flexibility. His vocalization and phrasing were of the highest order, but he lacked grace in figure and was a poor actor. He received high prices for his singing, yet he died in New York a poor man.

BRIGS OF AYR, THE. A delightfully humorous little poem by Robert Burns, reporting an imaginary colloquy between the old and new bridges (Scot. *brigs*) over the Ayr.

BRIHASPATI, brî-hûs'pâ-té, or **BRHASPATI**, br'hus'pâ-té (Skt. *Brhaspati*). A Hindu god prominent in the Rig-Veda, but of less importance in the later mythology of India. His name appears frequently also in the form *Brahmanaspati*, 'Lord of Strength,' or 'Lord of Prayer' (*brahman*), and as the incarnation of the *brahman*-lord he appears to have been the prototype of the god Brahma, the head of the later Hindu Trinity. (See BRAHMA.) Like the latter, also, he is "father of the gods," although himself begotten by Tvashtar, the artificer. He is portrayed in the Vedas as having 7 mouths, 7 rays, 100 wings, sharp horns, and armed with bow and arrows and an axe; he is ruddy and bright, dispelling the darkness; and he rides in a chariot drawn by ruddy steeds. Many of his attributes, and especially his aspect as a divine priest presiding over devotion and sacrifice, recall Agni, the god of fire, of whom he is regarded by many scholars merely as a variety. But his close connection with Indra (*q.v.*) in the Vedic hymns leads others to consider Brihaspati in his sacerdotal character as a priestly abstraction of Indra. In later times of the epic and the Puranas he is represented as a Rishi, or divine seer, and preceptor of the gods. He is regent of the planet Jupiter, with which his own name is commonly identified. His wife is Tara. Consult: Macdonell, *Vedic Mythology* (Strassburg, 1897); Strauss, *Brhaspati im Veda* (Leipzig, 1905); Formel, *Le dieu Brihaspati dans le Rîgveda* (Paris, 1898); Noble and Coomaraswamy, *Myths of the Hindus and Buddhists* (London, 1913).

BRILL (BRIL), brél. A family of Flemish landscape painters, of which the most important were Matijs and Paulus, brothers.—**MATJYS** (1550-84) was born in Antwerp and died in Rome. He was employed in the Vatican in the time of Gregory XIII, and instructed his brother Paulus, who succeeded to his pension.—**PAULUS** (1554-1626) was also born in Antwerp and died in Rome. He was one of the best of the Flemish landscape painters of his time; his influence was potent on the Italian schools of landscape painters. The poetic charm of his work may be seen as a setting to some of the figure painting executed by such masters as Annibale Carracci and Rubens. His works in oil and fresco are in many of the Roman churches. He had for patrons both Clement VIII and Sixtus V and executed many frescoes in the Vatican, the Lateran, the Scala Santa, Santa Magiore, and Palazzo Rospigliosi. Of his panel paintings the best are in Florence, Brunswick, Montpellier, Munich, Paris, Parma, and Vienna. Consult: Roose, *Geschiedenis der antwerpsche Schilderschool* (Antwerp, 1887-90); Eisler in

London, *Burlington Magazine* (1905), Mayer, *Das Leben und die Werke des Bruders Matthäus und Paul Brill* (Leipzig, 1910)

BRILL (probably Corn *brill*, mackerel, for *brithelli*, from *brith*, speckled) A species of turbot, found in considerable abundance on some parts of the British coasts, and common in the markets of the larger towns. It resembles the turbot, but is distinguished by its smaller size (18 inches), more oval outline, the want of tubercles on its upper surface, and its reddish hue. It has the same haunts and habits as the turbot, but its flesh is not thought quite so good.

BRILLAT-SAVARIN, bré'ya' sa'va'rân', ANTHELME (1755-1826) A French writer on gastronomy, noted as the author of *Physiologie du goût* (1825), beyond compare the finest literary excursion into the field of gastronomy. He was born at Belley and was a Federalist. During the Reign of Terror he fled to Switzerland, and in 1793 to New York, where he supported himself by lessons and music till his return to Paris in 1796. He held office under the Directory and during the Consulate became judge in the Court of Cassation. His book reveals the genial host and friend, full of anecdote and shrewd observation. It is delightful, also, for its mock seriousness, its conscious grandiloquence, as when he invokes "Gasteria, the tenth and fairest of the Muses," and for the bizarre arrangement of his "meditations" on *Corpulence ou la théorie de la friture*. Two translations (London, 1877, New York, n.d.) of the *Physiologie* into English are fairly satisfactory. The English title is *Gastronomy as a Fine Art*.

BRILLIANT (Fr *brillant*, sparkling, from Lat *berillus*, beryl, gem) A name popularly given to the diamond, especially when cut so that the base or flat portion, called a *table*, is surrounded by 24 facets, which extend to the girdle, or central edge, above which are 32 facets, terminating in a point called a *culet*. See DIAMOND.

BRIMSTONE A name sometimes applied to sulphur, especially in the form of sticks or rolls. It is derived from ME *brimnen*, *brennen*, to burn + *ston*, stone, sulphur having been considered by the alchemists as the principle of combustibility. See SULPHUR.

BRIN, bién, BENEDETTO (1833-98) An Italian engineer and statesman, born in Turin. He studied engineering, became a chief of section in the Ministry of Marine, and was Minister of Marine in 1876-78, 1884-91, and from 1896 until his death. From 1882 he represented Turin in the Chamber of Deputies and in 1892-93 was Minister of Foreign Affairs. He did much to promote the mechanical development of the Italian navy and himself designed several armored cruisers. His writings include *La nostra marina militare* (1881) and *Relazione intorno al materiale di navigazione e salvataggio all'Esposizione del 1878 a Parigi* (1884).

BRINCKMAN, CARL GUSTAV, BARON (1764-1847) A Swedish statesman and poet. He was born at Brunnkyrka, near Stockholm, and studied at Upsala, Halle, Leipzig, and Jena. He became successively Secretary of Legation of the Swedish embassy at Dresden (1792), chargé d'affaires at Paris (1797), chargé d'affaires at Berlin (1801), Ambassador to London (1808), and court chancellor at Stockholm (1810). His poetical works include *Småtlets värld* (1822), for which he received the first prize of the

Swedish Academy, and *Tankebilder* (1828). Consult Wachtmeister, *Budrag till Carl Gustav von Brinckmans, biografi och karaktärsbild* (Lund, 1871).

BRINDABAN, brin'da-bûn' See BINDRABAN.

BRINDISI, brén'de-zé (anciently, Lat *Brundisium*, *Brundisium*, Gk *Ἰππὸν*, *Brentesion*, said to have received its name from the harbor projecting as do the antlers of a stag, from *βρέndon*, *brendon*, deer, stag) A seaport town of southern Italy, in the province of Lecce. It is situated on a small promontory in a bay of the Adriatic Sea, about 45 miles east-northeast of Taranto (Map Italy, M. 7). Brindisi is a city of very great antiquity. It was taken, in 267 B.C., from the Sallentines by the Romans, who some 20 years later established a colony here. The town, partly owing to the fertility of the country, but chiefly on account of its excellent port—consisting of an inner and outer harbor, the former perfectly landlocked, and capable of containing the largest fleets and of easy defense on account of its narrow entrance, which is also very well sheltered—rapidly increased in wealth and importance. It soon became the principal naval station of the Romans in the Adriatic. In 230 B.C. Brindisi was the starting place of the Roman troops that took part in the first Illyrian War, and from this point the Romans nearly always directed subsequent wars with Macedonia, Greece, and Asia. The city was the regular point of embarkation for Greece and the East, by way of Dyrrachium (Epidamnus). When the Roman power had been firmly established beyond the Adriatic, Brindisi became a city second to none in south Italy in commercial importance. Paeuvius (q.v.) was born at Brindisi. Horace, who accompanied Mæcenas in a diplomatic expedition to Brindisi in 38 or 37 B.C., has made the journey the subject of one of his satires (*Sat.* i, 5). Vergil died here in 19 B.C., on his return from Greece. The city appears to have retained its importance until the fall of the Empire, but it suffered greatly in the wars which followed. When the Normans became possessed of it in the eleventh century, the Crusaders made it their chief port for embarkation to the Holy Land, but with the decline of the Crusades Brindisi sank into comparative insignificance as a naval station. The city subsequently suffered greatly from wars and earthquakes. The principal buildings are the cathedral, where the Emperor Frederick II was married to Yolande in 1225, and the castle, commenced by Frederick II and finished by Charles V. Chief among the remains of ancient times is a column, 82 feet high, one of two, which, tradition says, marked the end of the Appian Way. The district around Brindisi is still remarkable for its fertility, olive oil being produced in large quantities. Since the opening of the Suez Canal and the construction of the Mont Cenis and St. Gotthard tunnels Brindisi has greatly increased in importance, being the landing place or point of departure for numerous steamship lines. Pop, 1881, 14,508, (commune) 1901, 25,317.

BRINDLEY, JAMES (1716-72) An English engineer, born in Derbyshire. He was apprenticed at 17 to a millwright, but afterward became an engineer, and in 1752 showed great ingenuity in contriving a water engine for draining a coal mine. The machine consisted of an atmospheric force pump and was soon

offset by the steam engine. His invention of a silk mill on a new plan and several other ingenious contrivances recommended him to the Duke of Bridgewater, who employed him to build the canal between Worsley and Manchester. Thenceforth he devoted his great skill and genius to the construction of navigable canals, commencing the Grand Trunk and completing the Birmingham, Chesterfield, and others. He was quite illiterate and did most of his work in his head without written calculations or drawings. Consult Samuel Smiles, *Lives of the Engineers*, vol. 1 (London, 1861-62).

BRINE (AS. *bryne*, literally, a burning, from *beornan*, to burn). The term applied to water highly impregnated with common salt. The waters of the oceans and many inland seas represent brines of different degrees of salinity. Natural brines are found in some porous sandstones, and may represent sea water imprisoned in these rocks at the time of their deposition. This is known as *connate water*. Brine springs are those natural waters containing much salt, which in many parts of the world issue from fissures in the ground. Consult Clarke, *United States Geological Survey, Bulletin 491*, 1912. See SALT SPRING; MINERAL WATERS; OCEAN; DEAD SEA.

BRINE SHRIMP. A small branchiopod crustacean (*Artemia salina*), which, unlike the greater number of animals of that group, is an inhabitant not of fresh, but of salt water. It is found in myriads swimming about in the brine of salt pans previous to boiling, when, having been concentrated by exposure to sun and air for about a fortnight, it destroys the life of almost all other marine animals. The full-grown brine shrimp is about half an inch long. One of the most curious things about this species is that it accustoms itself so readily to changes in the density of the water which it inhabits. It has been shown by experiment that if sufficient care is taken these animals can, after a number of generations, live in perfectly fresh water; but, more remarkable still, it will then be found that they are no longer *Artemia* at all, but resemble *Branchipus stagnalis*, a common fresh-water branchiopod, generically different from *Artemia*. This has been cited as a direct experimental proof of evolution, and as showing admirably the great effect of the environment upon the form and structure of animals. See PHYLLOPODA.

BRINFAREE (brin-já-ré) DOG. The Indian greyhound. See GREYHOUND.

BRINK, BERNHARD TEN (1841-92). A German philologist. He was born in Amsterdam and studied in Münster (1861-62) and Bonn (1862-65). He was professor of modern languages at the University of Marburg (1870-73) and professor of English at Strassburg (1873-92). Among his works are the following: *Chaucer, Studien zur Geschichte seiner Entwicklung*, vol. 1 (1870); *Geschichte der englischen Literatur*, vol. 1, Chaucer to Wiclif (1877; Eng. trans. by H. M. Kennedy, 1883); vol. ii, from Wiclif to the accession of Elizabeth (1896), in some respects the best history of English literature extant; *Chaucers Sprache und Verskunst* (1884; 2d ed., 1890; Eng. trans. by M. B. Smith, *The Language and Metre of Chaucer*, 2d ed., rev., 1901); *Beowulf, Untersuchungen* (1888); *Shakespeare: Fünf Vorlesungen* (1893; Eng. trans. entitled *Five Lectures on Shakespeare*, by Julia Franklin, 1895). He also published editions of Chaucer's *Prologue to the Canterbury Tales*

(1871), and of the *Complaynte to Pite* (among the writings of the Chaucer Society, London). From 1874 to the year of his death, he was editor of the *Quellen und Forschungen zur Sprach- und Culturgeschichte der germanischen Völker*.

BRINK, JAN TEN (1834-1901). A Dutch scholar and author, born in Appingedam. He studied theology in Utrecht, went in 1860 as tutor to Batavia, from 1862 to 1884 was instructor in the Dutch language and literature in the Gymnasium of The Hague, and in the latter year was appointed professor of the history of Dutch literature in the University of Leyden. His works, composed chiefly of studies in literary criticism, and stories, include: *Bulwer Lytton, Biografie en Kritiek* (1873); *Letterkundige schetsen* (2 pts., 1874-75); *Geschiedenis der Noord-Nederlandsche letteren in de XIX. eeuw* (3 vols., 1888-89; new ed., 1904); *Romans en novellen* (13 vols., 1885). His complete works in belles-lettres have appeared in 17 vols., as *Litterarische schetsen en kritieken* (Leyden, 1882-88).

BRINK'ERHOFF, ROELIFF (1828-1911). American banker, philanthropist, and penologist, born in Owasco, N. Y., June 28, 1828. He was for years the central figure in the National Prison Congresses as well as a prominent worker in the National Conferences of Charities and Correction. From 1878 until the time of his death he was a member of the State Board of Charities of Ohio and for many years its chairman. Through his efforts the public charitable and penological work in Ohio was maintained at a high level of efficiency. General Brinkerhoff enlisted in the volunteer army in the Civil War, attained the rank of colonel, and was breveted brigadier general for meritorious service. He was the author of *The Volunteer Quartermaster*, and *Recollections of a Lifetime* (1900), as well as of numerous articles and published addresses on philanthropic subjects.

BRINKLEY, FRANK (1844-1912). An English editor. While still a young man he went to Japan and there in 1867 had command of the Royal Artillery, in 1871 was principal instructor in the Marine Artillery College at Tokio, and later was professor of mathematics at the Imperial Engineering College. He became proprietor and editor of the *Japan Mail* in 1881, and continued to edit this journal until the year of his death. One of the leading authorities on matters relating to Japan, he was made foreign adviser to the Nippon Yusen Kaisha and Tokio correspondent of the London *Times*, and published *Japan* (1901), *Japan and China* (1903), *Unabridged Japanese-English Dictionary*, and articles on Japan in encyclopedias. The Japanese Order of the Sacred Treasure was conferred upon him.

BRINTON, DANIEL GARRISON (1837-99). An American archaeologist and ethnologist. He was born at Thornbury, Pa., graduated at Yale in 1858 and at Jefferson Medical College in 1861, and subsequently studied in Paris and Heidelberg. He served in the army as a surgeon, was editor of the *Medical and Surgical Reporter* from 1867 to 1887, and became professor of ethnology at the Philadelphia Academy of Natural Sciences in 1884, and of American linguistics and archaeology in the University of Pennsylvania in 1886. In 1894 he was president of the American Association for the Advancement of Science. His chief works are *The Myths of the New World* (1868; 3d ed., 1896); *The Religious*

Sentiment (1876), *American Hero Myths* (1882), *Races and Peoples* (1890, 2d ed, 1901), *The American Race* (1892), *Religions of Primitive Peoples* (1897), *The Basis of Social Relations* (1902). Perhaps his richest contribution to anthropology was his *Library of Aboriginal American Literature* (8 vols, 1882-85), designed to "put within reach of scholars authentic materials for the study of the languages and culture of the native races of America." Just before his death he gave his entire library of books and manuscripts to the University of Pennsylvania.

BRINTON, JOHN HILL (1832-1907). An American surgeon. He was born in Philadelphia and graduated at the University of Pennsylvania and the Jefferson Medical College. At the outbreak of the Civil War he volunteered his services and remained in the army until 1865, attaining the position of brigade surgeon. He was connected with many hospitals in Philadelphia. In 1882 he was appointed professor of the practice of surgery and of clinical surgery in the Jefferson Medical College.

BRINVILLIERS, brān'vél'ya, MARIE MADELINE MARGUERITE, MARQUISE DE (c 1630-76). A French woman notorious as a poisoner. She was born about 1630 and married in 1651 the Marquis de Brinvilliers. Incensed at her scandalous life, her father caused her lover, Sainte-Croix, to be thrown into the Bastille. There Sainte-Croix learned of an Italian named Exili the art of compounding poisons, and when free imparted the secret to his mistress, Brinvilliers. Brinvilliers poisoned her father, her two brothers, and her sister, and attempted to poison her husband. But Sainte-Croix, not over-anxious to succeed to the latter's place, supplied him with antidotes. In 1672 Sainte-Croix died, poisoned by accident, his death led to an investigation that revealed the enormity of Brinvilliers' crimes. The Marquise fled, but was captured and executed, July, 1676. Brinvilliers seemed a woman of great piety, attended church regularly, and once, espousing the cause of a poor girl, poisoned a whole family. Her exposure soon led to the discovery of the famous poisoner La Voisin (qv). Consult *Pirot, La Marquise de Brinvilliers* (Paris, 1893). See also CHAMBERE ARDENTE.

BRINZ, brēntz, ALOYS VON (1820-87). A German jurist and legislator. He was born at Weier, Bavaria, and studied philology and law in Munich and Berlin. He was professor of Roman law at the universities of Erlangen, Prague, Tübingen, and Munich. In 1861 he was elected to the Imperial Council of Austria and became one of the chief defenders of the German interests in Bohemia. His principal work is the *Lehrbuch der Pandekten* (2 vols, 1857-71, 3d ed., 1884), and other important contributions to the literature of jurisprudence are the following: *Zum Rechte der Bonae Fidei Possessio* (1875), *Zur Contraindicatio* (1877), *Zum Begräff und Wesen des römischen Procurator* (1885), *Ueber den Einlassungswang in Römischen Recht* (1887).

BRION, brē-ōn', Fr pron brē-ōn', FRIEDRIKE ELISABETH (1752-1813). One of the most famous of Goethe's sweethearts, born at Niederrodern (Alsace), better known, from her place of residence near Strassburg, as Friederike von Sessenheim, and a prominent figure in Goethe's *Dichtung und Wahrheit*. (See GOETHE.) She inspired many of Goethe's early lyrics and has been

declared the original of Maria in *Goiz von Belshungen* as well as of Gretchen in *Faust*. Consult Duntzer, *Friederike von Sessenheim in Lichte der Wahrheit* (Stuttgart, 1893), and A. Bielschowsky, *Friederike und Lili* (Munich, 1906).

BRION, GUSTAVE (1824-77). A French genre painter. He was born in Rothau in the Vosges Mountains and studied at Strassburg with Gabriel Guerin and the sculptor Andreas Friedrich. He is the painter par excellence of the life and customs of his Alsatian home, which he depicts with an art more distinguished by literary than by technical qualities. Among his best paintings are "The End of the Deluge" (Louvre) and "The Potato Harvest during the Inundation" (Nantes); he is well represented in the museums of Strassburg and Colmar. He is also well known for illustrations, those of Victor Hugo's *Les Misérables* deserving of special admiration for the way in which they reproduce the spirit of the work and of modern life.

BRION, brē-ōn', LUIS (1782-1821). A Colombian naval officer. He was born in Curaçao, was educated in Holland, served in the Dutch army, and studied navigation in the United States. With the backing of a large inherited fortune, he engaged successfully in a shipping and mercantile business, but, at the outbreak of the War of Independence, joined the revolutionists. Having fitted out a fleet of ships at his own expense, he cooperated with Bolívar, defeated the Spanish on the island of Margarita, and distinguished himself in the conquest of Guiana. He sat in the Congress of Angostura, which proclaimed the independence of Colombia.

BRIOSCHI, brē-ō'skē, FRANCESCO (1824-97). An Italian mathematician, born and died in Milan. Taking the doctorate at the University of Pavia in 1845, he became professor of applied mathematics in the same university in 1852 and in 1862 was commissioned by the government to found and organize the Istituto Tecnico Superiore at Milan. Together with Tortolini he founded in 1858 the *Annali di Matematica*, which he edited until his death. One of the great mathematicians of his time, he contributed especially to the development of the theories of invariants, equations (especially those of the fifth and sixth degrees), and elliptic functions. Among his distinguished pupils were Cremona, Beltrami, and Casorati. His Works were published in 5 vols (Milan, 1902-09). Consult his biography by Noether, *Mathematische Annalen*, vol. 1, pp 477-491 (1898).

BRIOSCO, brē-ōs'kō, ANDREA (1470-1532). See RICCIO, ANDREA.

BRIQUETTE. See CEMENT, FUEL.

BRISBANE, briz'hān (named in honor of Sir Thomas Brisbane). A seaport, the capital of Queensland, Australia, about 500 miles north of Sydney, situated 25 miles from the mouth of the Brisbane River (Map Queensland, H 9). Regular steam communication is kept up with European and Australian ports. Several railroads terminate here. The Victoria steel bridge, 1040 feet in length, spans the river. A prior bridge and nearly half of South Brisbane were destroyed by flood in 1893. South Brisbane became a separate municipality in 1883 and a city in 1903. Brisbane is the seat of a United States consular agency, the see of Anglican and Catholic bishops, and has two cathedrals, numerous churches, banks, and newspapers, four parks, a museum, a school of arts, and a university. The principal industries are boot factories, soap

works, breweries, tanneries, etc. Brisbane dates from a penal colony established in 1825 and abandoned in 1839. Its growth began in 1842 with the advent of free settlers, and in 1859 it was made the capital of Queensland. Pop., 1901, 28,953; within a 10-mile radius, 119,428; 1911, 141,342.

BRISBANE, briz'bān, ARTHUR (1864-). An American newspaper editor, born in Buffalo, N. Y., and educated in the public schools of this country and in Europe. He began newspaper work (1882) in New York City as a reporter for the *Sun*, later becoming that paper's London correspondent. Following this period he was editor of the *Evening Sun* and then managing editor of the *World* for seven years. In 1897 he accepted the editorship of the New York *Evening Journal*. The immense combined circulation of this paper and the others in the Hearst "chain" throughout the country made Brisbane's opportunity for wide influence as an editor unmatched in the United States. By one part of the community Brisbane is considered a maker of pernicious, if effective, appeals to popular passion and prejudice; by another he is looked upon as a sort of lay preacher of all that is beneficent. However one may regard the content of his writing, it cannot be denied that his direct and forceful style has influenced the form of contemporary American editorials. He was a special lecturer before the School of Journalism of Columbia University in 1913. Some of his writings were collected in 1906 under the title *Editorials from the Hearst Newspapers* and in 1908 he published *My Buler Glover Eddy*.

BRISBANE, SIR THOMAS MAKDOUGALL (1773-1860). A British general and astronomer. He was born at Brisbane, the hereditary seat of his family, near Largs, Ayrshire, July 23, 1773. At the age of 16 he entered the army as an ensign, and in the following year, when quartered in Ireland, became intimate with Arthur Wellesley, afterward Duke of Wellington. With a company that he raised in Glasgow in 1793, Brisbane took part in all the engagements of the campaign in Flanders. Sent to the West Indies in 1795, he distinguished himself under Sir Ralph Abercromby, and in 1812, under the Duke of Wellington, in Spain. Appointed Governor of New South Wales in 1821, he introduced many reforms, especially in penal treatment, and promoted horse breeding and the cultivation of sugar cane, the vine, and tobacco. Immigration began during his administration, but he unwisely gave so much power to the immigrants that great financial confusion resulted, and he was recalled at the end of 1825. The town of Brisbane was named after him, also the river on which it stands. As a man of science Brisbane holds a higher place than as an administrator. While in Australia he made a catalogue of 7385 stars, which is known as the *Brisbane Catalogue*, and for which he received the gold medal of the Astronomical Society. On his return to Scotland he had an astronomical observatory established at his residence at Makerstoun and devoted himself entirely to scientific pursuits. He entered warmly into the plans of the British Association for ascertaining the laws of the earth's magnetism and in 1841 had a magnetic observatory erected at Makerstoun, the observations made there filling three large volumes. He was made a baronet in 1836, G.C.B. the following year, received from Oxford the

degree of D.C.L., and succeeded Sir Walter Scott as president of the Royal Society of Edinburgh. He died at Largs, Jan. 27, 1860.

BRISÉ. See BRIZURE.

BRISÉ'IS (Gk. *Βρισηΐς*, *Brisēis*). In Homer's *Iliad*, the daughter of Briseus and the captive of Achilles. When Agamemnon was obliged to surrender Chryseis (q.v.) to her father, he took Briseis from Achilles (q.v.), thus causing Achilles to withdraw from the fight against Troy, and paving the way for all the events of the *Iliad*.

BRISIACUS MONS. See BREISACH.

BRISSAC, bré'shak', CHARLES DE COSSÉ, COUNT OF (1505-63). A marshal of France. He fought against the English and the Imperial troops in 1544-46 and was made a marshal in 1550. In 1559 he became Governor of Picardy, and in 1563 of Normandy.

BRISSON, bré'sōn', BARNABÉ (Lat. *Brissoniensis*) (1531-91). A French jurist and diplomat, born at Fontenay-le-Comte, of a distinguished family. Brisson chose the legal career, and rapidly advanced in his profession. In 1575 he became King's Advocate, later Counselor of State, and in 1583 president of a provincial tribunal. He was dispatched on a diplomatic mission to England to arrange a marriage between Elizabeth and the Duke of Anjou; and thereafter he was frequently sent as envoy to foreign countries. In 1588, when King Henry III was obliged to flee from Paris, Brisson remained behind, apparently in the hope of reconciling the King and the people. After the King's death in August, 1589, Brisson resisted the intrigues of the Spanish ambassador and the claims of the papal envoy and had the Duke of Mayenne proclaimed lieutenant general of the kingdom. He unfortunately fell under suspicion of favoring Henry IV and, at the orders of the Council of Sixteen, was arrested and hanged, Nov. 15, 1591. Brisson was a man of remarkable judgment and learning and was held in such esteem by Henry III that that monarch declared no king had in his service so learned a man as he. His literary works were numerous; the most important are the following: *De Verborum Quæ Ad Jus Pertinent Significatione*, etc. (1557); *Observationum Divini Et Humani Juris Liber* (1564); *De Formulæ Et Solennibus Populi Romani Verbis*, etc. (1583), a work of great value not yet superseded, last edited by Conrad (1781); *Code de Henri III* (1587); *Nota in Titum Livium* (1588); *Opera Minora*, chiefly on Roman law and institutions (1606), etc. Consult Le Bas, *Dictionnaire encyclopédique de la France*, vol. iii (Paris, 1835-63).

BRISSON, EUGÈNE HENRI (1835-1912). A French statesman. He began the practice of law in 1859, but engaged also in journalism, and in 1868, together with Challemeil-Lacour and Allain-Targé, established the *Revue politique*. He was elected to the National Assembly as a Republican in 1871 and soon submitted a proposition of amnesty for all political offenders. He became President of the Chamber of Deputies in 1881, was the head of the French cabinet in 1885 (April to December), was again chosen President of the Chamber of Deputies in 1894, and was once more head of the ministry from June to October, 1898, his fall being due to the consent of the ministry to a revision of the Dreyfus case. In the election for President of the Republic, Jan. 17, 1895, he received 361 votes to 430 for Félix Faure. He was chosen President

of the Chamber of Deputies in January, 1904, but failed of reelection in the following year owing to a combination of forces hostile to the Combes ministry. He became President again, June, 1906, receiving 500 of 581 votes in the Chamber. He wrote *La congrégation, aperçu historique* (1902), *Souvenirs, Affaire Dreyfus* (1908).

BRISSON, MATHURIN JACQUES (1723-1806) A French natural philosopher, born at Fontenay-le-Comte (Vendée). He was instructed by the famous Reaumur and was professor of physics in Paris, successively at the Collège de Navarre, the Ecoles Centrales, and the Lycée Bonaparte. In his own way he was widely known as an ornithologist, particularly through his 6-volume *Ornithologia* (1760, with 500 plates), since quite superseded. His further works include a *Dictionnaire raisonné de physique* (2 vols, 1781, 4 vols, 1800) and *Pesanteur spécifique des corps* (1787).

BRISSET DE WARVILLE, bré'sô' de var-vêl', JEAN PIERRE (1754-93). A French jurist and politician. He was born at Chartres, Jan. 14, 1754. Though his father was a "modest innkeeper," Brisset received a good education and was trained for the bar. Two scholarly works on criminal law, *Théorie des lois criminelles* (1780) and *Bibliothèque des lois criminelles*, published soon after, established his reputation as a jurist. His passion for political studies carried him beyond the narrow bounds of his profession, and, in conjunction with his friends Clavière and Muraubeau, he produced several works on finance. A master of the English language, he attempted to conduct in London a journal entitled *Journal des Lycées*, but, not being successful, returned to Paris. He was imprisoned in the Bastille for four months on a false charge of having written a brochure against the government. Upon his release he again engaged in the writing of pamphlets upon politics and economics, and was compelled to take refuge in England for a time, on account of his fearless expression of opinion upon the condition of affairs in France. In 1788 he founded the Society of the Friends of the Negroes (Société des Amis des Noirs), and visited the United States to study the problems of slavery and emancipation and to promote the abolition of the slave trade. At the outbreak of the Revolution he returned to France and entered actively into political affairs, establishing a journal, *Le Patriote Français*, which at once became the recognized organ of the Republicans. He became the leader of a strong group of young reformers, who were known as Brissotins and who afterward formed the Girondist party. He was frequently consulted by the Constitutional Committee of the Assembly, and in 1791 was elected to that body from Paris, against the opposition of the court party. In the Legislative Assembly his influence upon the foreign policy of France was predominant, and he was responsible for the beginning of the Wars of Revolutionary Propaganda, was also a member of the Convention and used his influence against anarchy and for moderation. He disapproved the execution of the King and urged that the question be submitted to the people. He thus incurred the distrust and hostility of the extreme Jacobins, who came into power in 1793, and was one of the 21 Girondist leaders who were guillotined on October 31 of that year. Consult Brisset, *Mémoires pour servir à l'histoire de la Révolution* (4 vols, Paris, 1830; new

ed. by Leseure, 1877), and Desmoulins, *The History of the Brissotins*, trans. from the French (London, 1794).

BRISTED, CHARLES ASTOR (1820-74). An American author, son of the Rev. John Bristed and grandson of John Jacob Astor. He was born in New York and was educated at Yale and at Trinity College, Cambridge, England. For several years he was contributor to periodical literature under the signature "Carl Benson." He was one of the first board of trustees of the Astor Library. Among his collected works are *The Upper Ten Thousand of New York* (1852), *Five Years in an English University* (1852), *The Concord Convention* (1864), *The Interference Theory of Government* (1867), and *Letters to Horace Mann* (1850), in which he replied to attacks upon John Jacob Astor and Stephen Girard.

BRISTLE BIRD. An Australian wren-like bird of the genus *Sphenura*, having two or three pairs of strong, recurved bristles at the angles of the mouth. Three species are known in southern and western Australia. "They mostly conceal themselves in thickets, especially in marshy places, flying very little, but running very quickly, and carrying the tail erect. The nest is built of dry grass, globular in form, and is of large size."

BRISTLES (dim. of *brust*, a bristle, of Ger. *Burste*, brush). The strong hairs growing on the back, and to a less extent on the sides, of the hog, wild boar, and some other animals, and extensively used in the manufacture of brushes and also by shoemakers and saddlers. The quality of bristles depends on the length, stiffness, color, and straightness, white being the most valuable. The best bristles are produced by pigs that inhabit cold countries. The Russian hog is a long, lean animal, and the thinner the hog the longer and stiffer the bristles. When the Russian hog is sent to the south and fattened, the bristles become soft and of course depreciate in value. In the summer the hogs are driven in herds through the forests, to feed on soft roots, etc., when they shed their bristles by rubbing against the trees. The bristles are then collected, sewed up in horse or ox hides, and find their way, through agents, to all countries. While the best bristles come from Russia, China with a somewhat inferior product is also a leading source and supplies from 60 to 75 per cent of all the bristles used for paint brushes in the United States. In American slaughterhouses the bristles of the slaughtered hogs constitute one of the by-products, but those from the modern hog, which is comparatively small and immature when slaughtered, are short and inferior in quality. In 1913 the imports of bristles into the United States amounted to 3,578,584 pounds and were valued at \$3,504,563. See BRUSH and BROOM.

BRISTLETAIL. Any small wingless insect of the order Thysanura, regarded as the simplest and lowest of all true insects. It dwells in dark, damp places, under bark, stones, etc., and sometimes infests the kitchens of untidy houses or the woodwork of bakeshops. In the same order are the springtails and podurids. The bristle-tails, or "silver fish" (*Lepisma*), are swift, agile creatures, having flat, fish-shaped bodies, covered with silvery scales, long, thread-like antennae, and two or more caudal filaments. They will destroy upholstery, bound books, etc., if neglected.

BRISTOE STATION. See BRISTOW STATION.
BRISTOL (ME. *Bristowe*, AS. *Briegstow*, the place at the bridge). An important maritime city and municipal, county, and parliamentary borough in southwest England, situated at the junction of the rivers Frome and Avon, chiefly in Gloucestershire and partly in Somersetshire, 118 miles west of London. It is 8 miles from the confluence of the Avon with the Severn estuary and about 11 miles northwest of Bath (Map: England, D 5).

The original town was composed of the territory bounded by the two rivers, but it has been extended from time to time, so that it now includes Clifton, Redcliffe, Horfield, Staple-ton, St. Thomas, St. George, etc. The area of the county borough is 17,460 acres. Bristol is remarkable for its specimens of mediæval architecture, chiefly ecclesiastical. The cathedral, formerly an Augustinian church (1148), has little to commend it but its handsome Norman chapter house, the Early English north aisle of the choir known as the Berkeley Chapel, and the Norman west portal. Some remains exist of the ancient castle, built probably by Geoffrey, Bishop of Coutances, and improved by Robert, Earl of Gloucester, in the early part of the twelfth century. St. James's Church (1130) is a good specimen of Norman architecture, and other noted churches are St. Philip's, St. Stephen's, All Hallows, St. John's, the Mayor's Chapel, and the Temple Church, but more famous than these, perhaps, is the fourteenth-century church of St. Mary Redcliffe, which is notable for its symmetrical proportions and richness of design. Its tower, more than 200 feet high, was partly destroyed by lightning in 1445, but was rebuilt in 1872. Many interesting old houses are to be found in the Pithay and Maryleport Street. Clifton, the best known of Bristol's suburbs, is a favorite place of its wealthy residents. The suspension bridge over the Avon was, at the date of construction (begun in 1836), one of the largest in the world, having a centre span of 676 feet. The floating harbor and quays are very extensive and are formed by embanking and locking the old courses of the Avon, for which a new channel was cut (1800). In 1884 the city bought the Avonmouth and Portishead docks at the mouth of the Avon. A new dock, the Royal Edward, was opened at Avonmouth in 1908. "The Float," at Bristol, has an area of 85 acres and a depth of 22 feet; the water area of the Royal Edward is 30 acres and its depth at low tide 36 feet. Portishead dock covers 12 acres. The city is one of the most important ports in Great Britain, and its trade is of long standing. In the fourteenth century it had a large trade in cloths, leather, wine, and salt, and was one of the "staple towns." It was prominent in the early commercial ventures and in discovery. It is the port from which John Cabot sailed in 1497 upon the voyage which resulted in the rediscovery of the mainland of America. Bristol traders colonized Newfoundland and engaged largely in the commerce with the West Indies and the American Colonies. Shipbuilding has been a prominent industry there for many years. The *Great Western*, the pioneer in steam communication across the Atlantic (1838), was built at Bristol. The principal imports are cattle, oils, hides, petroleum, grain, tallow, and sugar; the exports are iron, copper, tin plate, coal, salt, cotton goods, earthenware, chemicals, and other manu-

factured products. In the foreign trade the total net tonnage entered in 1911 was 1,049,507, and cleared 817,398; total net tonnage arrived and departed, foreign and coastwise, 5,801,327. Total imports and exports in 1911 were valued at £15,557,506 and £4,016,936, respectively.

Bristol returns four members to Parliament. The city's affairs are administered by a lord mayor, a municipal council, and a board of aldermen. (See GREAT BRITAIN, *Local Government*.) The streets, which are mostly paved with wood or asphalt, are kept in excellent condition by the city's public-works department. Bristol owns and operates an electric light plant. The city maintains public baths and washhouses, charging a nominal price for their use, placing them within reach of the poorer classes of the people. There are numerous parks and pleasure grounds. Among its educational institutions are, in addition to its public schools, University College (1876), the nucleus of the University of Bristol (chartered 1909); Clifton College (1862), the ancient grammar school (1532), the technical college of the Company of Merchant Venturers (1885), a municipal library (with branch establishments), several museums, a zoological and a botanical garden, and an observatory. It has numerous benevolent and charitable institutions, the Queen Elizabeth Hospital, the Muller Orphanage, a sailors' home, a blind asylum, and several hospitals, including two municipal isolation hospitals. Bristol is the seat of an American consulate. Bristol was the seventh English city in size at the census of 1911, when the population of the county borough was 357,048, as compared with 339,042 in 1901, showing a gain of 5.3 per cent.

The city existed before the Roman invasion, but does not come into prominent notice until 1069, when Harold's three sons, in an attempt to regain their patrimony from William the Conqueror, sailed up the Avon, but were defeated under the walls of Bristol. Henry II gave the city its charter in 1171, and it received the rights of a county from Edward III. During the Civil War Bristol was alternately held by Royalists and Parliamentarians. The castle and fortifications were destroyed in 1655 by Cromwell's orders. A notable rising of the populace occurred in 1793 over the imposition of a bridge toll beyond the time fixed for its discontinuance, and the "Bristol Revolution" in 1831, during the Reform Bill agitation, resulted in the destruction of the bishop's palace, customhouse, and other public and private buildings, and in the loss of several lives. Among other celebrities born or connected with Bristol are William of Worcester, the poets Chatterton and Southey, the artist Laurence, Sydney Smith, Coleridge, and Hannah More.

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the Cabots" in *Royal Society of Canada, Transactions*, 2d series, vol. III (1897)

BRISTOL A city in Hartford Co., Conn., 18 miles west-southwest of Hartford, on the New York, New Haven, and Hartford Railroad (Map Connecticut, D 3) It has a public library and manufactures clocks, brass goods, tableware, knit goods, tools, etc. Bristol was incorporated in 1785, as a borough in 1803, and as a city in 1911 It adopted the commission form of government in 1911 Pop., 1900, 6268. 1910, 13,502 Consult Trumbull, *Memoir History of Hartford County* (Boston, 1886)

BRISTOL A borough in Bucks Co., Pa., 23 miles by rail northeast of Philadelphia, opposite Burlington, N. J., on the Delaware River, the Delaware and Lehigh Canal, and the Pennsylvania Railroad (Map Pennsylvania, M 7) It has a foundry, worsted, steel, and planing mills, and manufactures leather goods, carpets, cast-iron pipe, and wall paper Bristol, originally called Buckingham, was settled in 1681 A detachment of the American army was stationed here during part of the Revolution It was first incorporated in 1720, and the charter of that year, as revised in 1905, is now in operation The burgess holds office for four years, and the power of appointments is vested with the borough council The water works are owned by the borough Pop., 1900, 7104, 1910, 9256

BRISTOL A borough, port of entry, and the county seat of Bristol Co., R. I., 15 miles south by east of Providence, on Narragansett Bay, on the New York, New Haven, and Hartford Railroad and on the line of the Providence and New York Steamship Co. (Map Rhode Island, C 3) It contains a State Soldiers' Home, Benjamin Church Home for Aged Men, Old Ladies' Home, Children's Home, and a fine public library Bristol has an excellent harbor, and the principal industries are boat building and the manufacture of rubber, woolen, and cotton goods Pop., 1890, 5478, 1900, 6901, 1910, 8565

Many antiquarians believe that it was at or near the present Bristol that the Northmen, in the year 1000 and subsequently, built the dwellings mentioned in the Icelandic Sagas Within the limits of the present town the Narragansett village Mount Hope, the residence of Massasoit and King Philip, was located, and it was near here that the latter was killed in 1676 Bristol was first settled by the whites in 1680 and was incorporated as a town in 1746 In 1775 and in 1778 the English entered the town and did considerable damage In 1873 a portion of the township was annexed to Warren Consult Munro, *History of Bristol* (Providence, 1880), and Miller, *Celebration of the Two-Hundredth Anniversary of the Settlement of the Town of Bristol* (Providence, 1881)

BRISTOL A city in Sullivan Co., Tenn., and in Washington Co., Va. (the boundary line of the two States running through the principal street), 131 miles from Knoxville, on the Southern, the Virginia and Southwestern, the Norfolk and Western, and the Holston Valley railroads, and on Indian River (Map Virginia, B 5) It is important as a railway center and has extensive lumber and pulp mills, a coffin and casket factory, a tannery, foundries, a sheet-metal factory, a brick plant, and manufactories of metal polish and cleansers, stoves, buggies, wagons, and mine car wheels. The educational institutions include King College (Presbyterian), organized 1867, Sullins College (Methodist Epis-

copal, South), and Southwest Virginia Institute (Baptist), for women, established 1869 and 1884, respectively, and a normal college for negroes Settled in 1851, Bristol was incorporated the following year Bristol, Tenn., has adopted the commission form of government Bristol, Va., is governed by a mayor and council, elected every two years There are municipal water works Pop., 1910, 13,395 (7148 in Tennessee and 6297 in Virginia)

BRISTOL, CHARLES LAWRENCE (1859-) An American biologist, born at Ballston Spa, N. Y. He graduated from New York University, was instructor in science at River-view Academy in 1884-87, professor of zoology at the University of South Dakota in 1887-91, and after further graduate study at Clark University and the University of Chicago, became in 1894 professor of biology at New York University Professor Bristol directed several zoological expeditions to Bermuda and had charge of the transportation of live tropical marine animals to the New York Aquarium His publications include *The Metamorphosis of Nephelis* (1899) and "Treasures of the New York Aquarium" in the *Century Magazine* (1899)

BRISTOL BAY A shallow eastern arm of Bering Sea, north of the peninsula of Alaska (Map Alaska, F 7)

BRISTOL BOARD A thick, stiff paper or fine pasteboard, made with a smooth and sometimes with a glazed surface It was first made at Bristol, England, and is used by artists and draughtsmen

BRISTOL BRICK, or **BATH BRICK** A substance composed of fine-grit sand and used mainly for cleaning and polishing table cutlery and other bright steel surfaces It was formerly made only in Bristol, England, but is now produced in the United States

BRISTOL CHANNEL The largest inlet of the Atlantic Ocean in England, on the southwest coast, between South Wales and Monmouthshire on the north, and the counties of Devon and Somerset on the south, prolonged at its east end by the estuary of the Severn (Map England, B 5) It is about 80 miles long and 5 to 48 miles broad, the greatest breadth being between St Gowan's Head and Hartland Point It has an irregular coast line of 220 miles and receives a drainage of 11,000 square miles The chief rivers which flow into it are the Towy, Taft, Usk, Wye, Severn, Avon, Axe, Parrott, Taw, and Torridge The tides rise to an extraordinary height—at Bristol, 35 feet, at King's Road, 40 feet, and at Chepstow, a rise of 47 feet has been recorded Large ocean vessels can ascend the channel to the heart of the city of Bristol, which is nearer to London than either Liverpool or Southampton

BRISTOL, EARL OF See DIGBY, GEORGE

BRISTOW, BRISTO, BENJAMIN HELM (1832-96) An American lawyer and politician He was born in Elkton, Ky., graduated at Jefferson College, Pa., in 1851, and practiced law in his native State until the beginning of the Civil War, when he volunteered for service in the Union army and soon rose to the rank of colonel He was appointed United States Solicitor-General in 1870 and was nominated as Attorney-General of the United States in 1873, but was not confirmed From 1874 to 1876 he was Secretary of the Treasury, and in this office was active in the prosecution of the "Whisky Ring" (q v.).

This gave him a reputation as a reformer, and at the Republican National Convention of 1876 he received 113 votes on the first ballot for presidential candidate. In that year he removed to New York, where until his death he had a large legal practice. Consult D. Wilcox, *Memorial of Benjamin Helm Bristow* (Cambridge, 1897).

BRISTOW, GEORGE FREDERICK (1825-98). An American musician and composer. He was born in Brooklyn, N. Y., became a violinist in the New York Philharmonic Society in 1842; from 1851 to 1862 was conductor of the New York Harmonic Society, and subsequently conducted the Mendelssohn Union. He was also organist in various churches and a teacher of music in the public schools of New York. His works include *Up Van Winkle*, an opera produced in New York in 1855; an overture to an unfinished opera, *Columbus*; an oratorio, *Daniel* (1867); a cantata, *The Great Republic* (1880), with accompaniment for orchestra; five symphonies; two string quartets; and several anthems.

BRISTOW, JOSEPH LITTLE (1861-). An American public official and legislator, born in Wolf Co., Ky., and, after removal to Kansas, educated at Baker University. He held several minor political offices and owned and edited the *Salina* (Kans.) *Daily Republican* for five years, and the *Ottawa Herald* for more than a decade. In 1903 he bought the *Salina Daily Journal*. During two administrations (1897-1905) while fourth assistant Postmaster-General he brought to light the postal frauds in Cuba and carried through many important reforms in his department. President Roosevelt appointed him in 1905 a special commissioner of the Panama Railroad, and in 1909 he was elected to the United States Senate. Senator Bristow identified himself with the progressive wing of the Republican party in 1912, supporting Theodore Roosevelt as candidate for the Republican presidential nomination. He became known as one of the most diligent and effective members of the Senate, serving on many important committees. He was chosen chairman of the joint committee of the House and Senate to investigate the question of the general parcel post.

BRISTOW, or BRISTOE, STATION. A village in Prince William Co., Va., 4 miles southwest of Manassas Junction, on the Southern Railway. On Aug. 28, 1862, during the Civil War, General Jackson, by a sudden movement, captured a large quantity of Federal supplies and munitions of war which had been stored here; but, threatened by an attack of 40,000 Federals under McDowell, he withdrew on the 27th to the Bull Run battle ground. Here, also, on Oct. 14, 1863, the rear guard of General Meade's Federal army, under General Warren, repulsed with great gallantry the attack of a superior Confederate force under Gen. A. P. Hill, each side losing between 300 and 400 in killed and wounded.

BRISTOWE TRAGEDY, THE, or THE DEATH OF SIR CHARLES BADWIN. A narrative poem by Thomas Chatterton.

BREIT, or BRET. 1. The young of the common herring, formerly thought to be a small separate species, living along the New England coast. The term is frequently applied to the small fry of various other marine fishes. 2. A sailor's term for the food of the whalebone whale, which consists of entomostracans, ptero-

pods, and various other small surface-swimming animals.

BRITAIN. See BRITANNIA; GREAT BRITAIN. **BRITANNIA** (Lat., Gk. *Bperraria*, *Brettania*, from *Bperrai*, *Brettanoi*, Britons). The ancient name of England and Scotland. (See BRITANNICE INSULÆ.) Julius Caesar invaded Britain twice, in 55 and 54 B.C. In the latter year he subdued Cassivelaunus, who agreed to pay tribute; but as no Roman garrison was left, the island remained independent. The emperors Augustus, Tiberius, and Caligula maintained friendly relations with its chiefs, as they thought its subjugation would be too difficult. In 43 A.D., under Claudius, the conquest began. The first expedition secured a portion of the island, and from that time, in spite of stubborn resistance, especially by Caractacus and Boadicea, the invasion progressed steadily, and Britain became a Roman province. Agricola, in 78-85 A.D., finished the conquest up to the Firth of Forth and did much to Romanize the inhabitants. The people of the Highlands maintained their independence. In 122 A.D. Hadrian visited Britain and began the construction of the wall, known by his name, from the Tyne to the Solway, some 70 miles in length. Later, in 142 A.D., the wall of Antoninus was built across the narrowest part of the island, from the Firth of Clyde to the Firth of Forth, about 37 miles long. Both of these walls were intended as bases for military operations and were strengthened by numerous military posts. They do not mark the frontiers of the Roman possessions. The subsequent military history of Roman Britain is marked by few events of importance. (See CALEDONIA; CAURAUSIUS; PICTS; SEVERUS, SEPTIMIUS.) The Roman legions were withdrawn in 409 A.D., and Britain soon became the prey of invaders. See ANGLO-SAXONS.

In the later Empire, according to the *Notitia Dignitatum*, Britain formed a diocese of the prefecture of Gaul and was subdivided into five provinces: Maxima Caesariensis, Valentia, Britannia Prima, Britannia Secunda, and Flavia Caesariensis. The boundaries of these provinces are very uncertain. To insure the obedience of the natives, at least three Roman legions were usually in Britain. Under the Romans many towns (*coloniae* and *municipia*)—56 are enumerated by Ptolemy—arose in Britain and may have been the means of diffusing Roman law and civilization over the country. Among the most important were *Londinium* (London), *Eboracum* (York), *Verulamium* (St. Albans), *Camulodunum* (Colchester), *Durovernum* (Canterbury), *Venta Icenorum* (Norwich), *Aqua Solis* (Bath), and *Lincoln* (Lincoln). The Romans built many roads (*strata*), of which there are still numerous remains. (See WATLING STREET.) They also developed Britannia into a corn-growing country. Dualism was the religion of the Britons at their conquest by the Romans, but the latter introduced Christianity into the country. There are many remains still extant of the presence of the Romans in Britain, such as camps, roads, ruins of houses, baths, fuses, altars, mosaic pavements, painted walls, metallic implements and ornaments, weapons, tools, utensils, pottery, coins, sculptures, bronzes, inscriptions, etc. These remains have been held to show that the Romans sought to render their British conquests permanent, and that they had greatly improved the arts of the ancient Britons, as is evident on comparing the remains with

the far ruder native antiquities of the British pre-Roman or prehistoric era, such as tumuli, barrows, earthworks, so-called Druidical monoliths, and circles, cromlechs, canns, pottery, weapons, tools, utensils and ornaments, etc. But there is great dispute as to the extent to which the Romans had introduced into the country the refinements and luxuries of Rome itself.

Under the term "Britannia," Great Britain has been personified in the fine arts as a female seated on a globe or on an island rock, leaning with one arm on a shield, with the other hand grasping a spear or a trident. The first example of this personification is on a Roman coin of the time of Hadrian. The figure reappears first on the copper coinage of England in the reign of Charles II (1665), the celebrated beauty, Miss Stewart, afterward Duchess of Richmond, is said to have served as a model to the engraver, Philip Roettier. The Britannia that appears on the reverse of British copper coins since 1825 was the design of Mr. W. Wyon (See NUMISMATICS). Among a considerable number of good books on ancient Britain, consult especially Elton, *Origins of English History* (London, 1882), Scarth, *Roman Britain* (London, 1883), Holmes, *Ancient Britain and the Invasions of Caesar* (Oxford, 1907), *The Cambridge Medieval History*, vol. 1, chap. xiii (London and New York, 1911), which gives an excellent bibliography.

BRITANNIA METAL (first manufactured in England, see below). An alloy of tin, antimony, copper, and sometimes zinc. Its composition is adapted to the special uses for which it is intended, the relative amounts of its constituents being as follows: from 81 to 90 parts of tin, from 8 to 16 parts of antimony, from 1 to 2 parts of copper, and sometimes 2 parts of zinc. The alloy may be cast and is malleable, so that it can be rolled into thin sheets. Being harder than pewter, it largely superseded that alloy for many purposes, while its other valuable properties lead to its extensive use for domestic utensils, such as spoons, drinking cups, and teapots. With the introduction of the electroplating processes it found an increased application as a base for plated ware. A brilliant lustre can be given to Britannia metal by heating articles made from it in a bath containing cream of tartar, tartar emetic, hydrochloric acid, powdered zinc, and powdered antimony. By varying the proportions and omitting the zinc, golden, copper-red, violet, and blue-gray tints may be obtained. A metalising has been given to articles made from Britannia metal by heating them in an oil bath to 220° C. Britannia metal was first manufactured in Sheffield, England, by Hancock and Jessop, in 1770. At present Sheffield and Birmingham in England and Connecticut in the United States, are the principal localities of its manufacture. A variety of Britannia metal, consisting of 9 parts of tin and 1 part each of antimony, bismuth, and lead, is called *Queen's metal* and is used for the same purposes as Britannia metal.

BRITANNIA SECUNDA (Lat. second Britain). The Roman name of Wales (qv).

BRITANNIA TUBULAR BRIDGE See BRIDGE.

BRITANNICÆ INSULÆ (Lat. translation of Gk. *Ἰβερνικαὶ νῆσοι*, *Brettanikoi nēsoi*, British Islands). A term used by Greek and Roman authors for the British Isles, including Albion (England and Scotland) and Hibernia,

or Ierne (Ireland), with the adjacent islands. The Phœnicians visited these islands in order to procure tin. Herodotus, in the fifth century B.C., mentions the Tin Islands, but knows nothing definite about them or their location. Aristotle, in the fourth century B.C., is the first to mention them by name, and speaks of only the two, Albion and Ierne. Pytheas of Massilia, a little later, made a voyage to the British Isles, and described them and their inhabitants at considerable length. Julius Cæsar was the first to call Albion "Britannia." Strabo and Diodorus Siculus both speak of Britain at some length. Ptolemy, about 150 A.D., described Ievaina and Albion much more accurately. He located Scotland erroneously, but he gave an excellent account of the coast of England. Consult Tozer, *History of Ancient Geography* (Cambridge, 1897).

BRITANNICUS The son of the Emperor Claudius and Messalina, born Feb. 12, 41 A.D. His real name was Tiberius Claudius Cæsar, but the title *Britannicus*, by which he is known in history, was bestowed by the Senate after Claudius' campaign in Britain in 43. In 48 Messalina was put to death, and Agrippina, who now gained the ascendancy over the Emperor and soon after married him, persuaded him to pass over his own son, Britannicus, and name as his successor her son, Nero (See AGRIPPINA, 2). Fearful that Britannicus might prove a rival, Nero, as Emperor, caused him to be poisoned by Locusta, early in 55.

BRITISH AMERICA The general term applied to the British possessions of North America north of the United States, which thus include Canada and Newfoundland. With a broader meaning British America includes also all British possessions on or adjacent to the American continent, in addition to the above it includes the Bermuda Islands, the British West Indies, and the Falkland Islands.

BRITISH ARMY See GREAT BRITAIN.
BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE See ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE.

BRITISH CENTRAL AFRICA A name formerly applied to the British territory north of the Zambesi River, including the northern part of Rhodesia (qv), and the Nyasaland Protectorate (qv), known from 1893 to 1907 as the British Central Africa Protectorate.

BRITISH CENTRAL AFRICA PROTECTORATE A British colonial possession in Central Africa. See NYASALAND PROTECTORATE.

BRITISH COLUMBIA The third largest province of the Dominion of Canada (Map Canada, E 5), situated on the Pacific coast, between the United States and the Yukon Territory, lat. 49° and 60° N. The southern extension of Alaska forms a narrow strip between its northern half and the sea, as far south as Portland Canal, below which the coast is bordered by the Queen Charlotte and other lesser islands and by the great island of Vancouver (qv). The eastern boundary of the province follows the main divide of the Rocky Mountains north to the 54th parallel, and then conforms with the 120th meridian of west longitude to its intersection with the 60th parallel. Area, about 353,000 square miles. (As the main divide of the Rocky Mountains has not been determined throughout, and part of the boundary of the southern extension of Alaska is still undefined, it is only possible to give the area of the province approximately.)

Topography. Except the northeastern corner, which belongs to the central lowland of North America, British Columbia forms part of that broad mountainous highland belt which accompanies the Pacific side of the continent and is termed the North American Cordillera. Within the province it may be divided into four longitudinal belts, named from east to west as follows: (1) the Rocky Mountain system; (2) the Central Plateau; (3) the Coast Range; and (4) the Island Range. The general trend of all these belts is northwest-southeast. The Cordillera, measured from the central lowland to the Pacific, decreases from a width of about 450 miles on the southern to 350 miles on the northern border of the province.

The Rocky Mountain system is further subdivided into two longitudinal belts by a remarkable trough-like valley, some 900 miles long, termed the Rocky Mountain Trench, which is drained by streams alternately flowing in opposite directions, viz., the middle Kootenay (flowing southeast), the upper Columbia (northwest), the Canoe (southeast), the upper Fraser (northwest), the Parsnip (northwest), the Finlay (southeast), and Kachika (northwest) rivers. To the northeast of this trench lie the Rocky Mountains proper, to the southwest the remaining members of the system. These are distinctly developed only in the southern part of the province. Three ranges may be distinguished, which are separated by secondary longitudinal trenches. From east to west these are: (1) the Purcell Range, bounded on the west by Kootenay Lake and the Duncan River; (2) the Selkirk Mountains, bounded on the west by the south-flowing section of the Columbia River and its expansion, Upper and Lower Arrow Lakes; and (3) the Gold Range, which is bounded on the west by the plateau region. These three ranges are distinct in structure from the Rocky Mountains proper. To the north a fourth range may be distinguished, the Cariboo Mountains, paralleling the left bank of the northwest-flowing section of the Fraser River.

Of the Rocky Mountains proper only the western slope south of lat. 54° belongs to the province. On the whole they decrease in elevation from the south, where many peaks attain 10,000 feet elevation or more, to the north, where the mean altitude drops to 5000 feet near the Liard River, which may be considered to be their northern limit as a distinct range. They culminate in the region of the headwaters of the North Saskatchewan and Athabasca rivers, where, near the former, Mount Bryce attains about 13,000 feet altitude, and, near the latter, Mount Robson, the highest known peak in British Columbia, has, by triangulation, an elevation of 13,068 feet. The range is crossed in its entire width by the transverse valley of the Peace River in 56° N. (2000-1800 feet), and numerous relatively low gaps afford easy passage from one side to the other. Among these the most important are the Crow's Nest Pass in lat. 49° 30' (4449 feet), followed by a branch of the Canadian Pacific Railway; the Kicking Horse Pass in lat. 51° 30' (5320 feet), followed by the transcontinental line of the same railroad; and the Yellowhead Pass in lat. 53° (3738 feet), followed by the transcontinental line of the Grand Trunk Pacific Railway. Of the three ranges constituting the remainder of the Rocky Mountain system, as

here defined, the Selkirk Mountains are by far the most conspicuous. Their rock composition, which consists mainly of schists and quartzites, coupled with the greater glaciation due to the heavier precipitation from the prevailing westerly winds, has given them a far more alpine appearance than the Rocky Mountains with their layers of limestones and shales whose disintegration gives them a castellated or crinellated appearance. If the designation be justified, the Selkirk Mountains, more than any others, deserve to be called the "Switzerland of America." The highest part of the range lies to the north, where many peaks exceed 10,000 feet in altitude. In the vicinity of the Canadian Pacific Railway, which crosses the Selkirks by Rogers Pass (4351 feet), lie Mount Sir Donald (10,808 feet) and Mount Dawson (11,113 feet). To the north, within the "Big Bend" of the Columbia River, lies the highest known peak of the system, Mount Sir Sandford (11,634 feet). Of the explored glaciers, Illecillewaet Glacier is the best known, Sir Sandford Glacier the longest (7 miles).

The other two ranges—the Purcell Range to the east, and the Gold Range to the west of the Selkirk Mountains—are similar to them in structure, although of lesser elevation. In the former, however, Mount Nelson (lat. 50° 24') attains 10,000 feet; the highest peak in the Gold Range, Joss Mountain, is only 7900 feet high.

Between the subdivisions of the Rocky Mountain system the Columbia River follows a rather remarkable course. Rising in lat. 50° 12' in Upper Columbia Lake, within a mile of whose upper end, and separated from it only by a low gravelly flat, flows the Kootenay River, the Columbia flows northwest, as stated above, in the Rocky Mountain Trench to a little beyond lat. 52°, where it turns abruptly south, or even southeast, forming an acute angle with its upper course, and flows between the Selkirk Mountains and the Gold Range out beyond the limits of the province.

Between the Rocky Mountain system on the east and the Coast Range on the west lies the Central Plateau. A series of longitudinal ranges in lat. 55° and 56° (Babine Range, Firepan and Omineca Mountains) divide this district into two parts, a northern and a southern. The former, which consists mainly of the basin of the Stikine River, is quite rugged, being interrupted in its plateau character by several mountain ranges, notably by the Cassiar Mountains. The southern part, which is specifically known as the Interior Plateau of British Columbia, has a mean elevation, at its plateau surface, of 3500 feet. Into this the main rivers have eroded deep valleys. The most important of these is the Fraser, which, rising in Yellowhead Pass, first flows northwest in the Rocky Mountain Trench and then turns abruptly, repeating on a larger scale the behavior of the Columbia, flows south diagonally across the Interior Plateau, and finally issues into the sea after having rounded the southern end of the Coast Range. A typical feature of the Interior Plateau is the large number of lakes which dot its surface. Chief among these are, in the north, Tlacla, Babine, and Stuart lakes; in the centre, Quessnel Lake; and, in the south, Adams, Kamloops, Shuswap, and Okanagan lakes. The Interior Plateau is characterized by the absence of forest; it is a prairie region of a considerable degree of aridity.

The Coast Range rises like a mighty wall which shuts off the interior of the province from the sea. It extends for at least 800 miles from the lower course of the Fraser on the south to Lynn Canal in the north, beyond which it may be considered to lie on the inland side of the St. Elias Range. Its peaks average 7000 to 8000 feet in altitude, in the south Mount Alford is the highest peak (8450 feet), in the north, Kate's Needle (9064 feet) in lat. 57°. The chain is crossed through its entire width by the Taku, Stikine, Nass, and Skeena rivers. On its ocean side the Coast Range is deeply indented by numerous fiords, which owe their origin to the same causes as those of Norway, with which country, indeed, this western margin of British Columbia compares very closely, both in configuration and climate. The direct impingement of the moisture-laden winds from the Pacific makes for very heavy snowfall on the seaward slope. North of Dixon Entrance (54° 30') the western slope is in Alaskan territory, within the stretch of coast belonging to British Columbia the most important fiords are, from south to north, Bute Inlet, Knight Inlet, Bulke Channel, Dean Channel, Douglas Channel, and Observatory Inlet.

The Island Range, the westernmost of the four subdivisions of the Cordillera in British Columbia, consists of Vancouver Island and the Queen Charlotte Islands. These represent the remnants of a longitudinal mountain system which was severed from the mainland by the subsidence of the coast. Vancouver Island, with a length of about 285 miles, a maximum width of about 75 miles, and an area of about 12,400 square miles, nearly touches the mainland in its northern portion, where the dividing straits, Johnstone Strait and Discovery Passage, are only a mile or two wide. The mountain range of which the island consists culminates in the north-central portion in Mount Victoria (7484 feet). In the southern portion Mount Arrowsmith attains nearly 6000 feet. The seaward coast of the island is indented by fiords, though less pronounced than those of the mainland. Nevertheless, Alberni Canal in the south and Quatsino Sound in the north nearly truncate the island. The Queen Charlotte Islands consist of a triangular-shaped archipelago with its base in the north and its apex in the south. It is separated from the mainland by Hecate Strait and from the Alaskan islands by Dixon Entrance. Two main islands compose the group. Graham Island in the north, hollowed out in its centre, as it were, by Masset Inlet, and Moresby Island, whose mountain axis culminates in the San Christoval Mountains, about 4000 feet in altitude.

The only remaining portion of the province to be discussed is its northeastern corner, which does not form part of the North American Cordillera. This district belongs to the great central lowland of the continent. It is mainly a region of open plains gradually merging into the forest region in the north, with a mean elevation of 1300 to 1400 feet. The northern portion, which is not well known, is mainly drained by the Fort Nelson River, a right affluent of the Liard. Farther south the Peace River with its tributaries, the Halfway, and the North and South Pine rivers, drain a territory which has recently been opened up to agricultural development.

Climate and Agriculture. The equable, tem-
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perate climate which its position on the western margin of the continent in mid-latitudes would insure to British Columbia is strongly modified by the relief of the province. The position of the Coast Range at right angles to the direction of the prevailing winds limits this climate, which is similar to that of western Europe, to a relatively narrow coastal strip, while the general northwest to southeast trend of the relief features of the province makes for a zonal arrangement of the climate in the same direction rather than along the parallels. The prevailing winds come steadily from the west, and reach the land warm with their passage over the vast breadth of the Pacific, whose waters on this coast have a temperature of 52° F. (about the same as on the Irish coast), or 20° warmer than those of the northwestern Atlantic. These warm winds are loaded with moisture. They are chilled by their first contact with the high coast mountains, causing rapid condensation of the moisture and a heavy rainfall, accompanied by liberation of heat. This is more marked at the northern end of the province than in the south. The consequence is an equable rainy climate on the coast, very similar to that of the south of England, the rainfall usually amounting to about 80 inches at Vancouver. It is least copious in the early autumn. At Victoria the mean temperature for January is 37.2° F., for July, 59.6° F., and flowers bloom all the year round in the gardens. At Agassiz, in the lower Fraser valley, the figures are 33° and 63.9°. Relieved of much of their moisture and warmth, lifted up to 8000 or 9000 feet, and cooled and rained by crossing the coast mountains, the west winds are kept at that height by the buoyant currents of warm air rising from the heated valleys, and blow across the great interior plain without interruption, hence over this wide area rain is very infrequent in summer, the snowfall is light in winter, and there result the conditions of drought, treelessness, and extremes of heat and cold, which are characteristic of interior plains everywhere. At Kamloops, about 200 miles from the coast, the annual rainfall hardly amounts to 12 inches, and the thermometer varies from 100° above zero in midsummer to 40° or 50° below zero in midwinter. Agriculture depends upon irrigation, the table-lands are covered with bunch grass, and the climate is like that of Idaho or Alberta. East of these interior valleys, however, stand the Rocky Mountains, whose summits catch the wind and collect from it almost all its remaining moisture. Hence the Gold Range and Selkirk are covered in all their lower slopes with heavy forests, their crests bear hundreds of glaciers, and the snowfall in the passes amounts to 30 feet in depth, and hence, also, the powerful rivers they sustain. Little moisture is left for the easternmost parts of the Rockies, whose climate is comparatively dry, very cold and clear in winter, and whose forests are thin. Similar conditions in the north, with the favorable addition of the chinook, make the Peace River valley not only pleasantly habitable, but clothed with a vegetation much like that of Ontario, and possessed of climatic and agricultural possibilities similar to those of Scotland.

Soils vary, of course, over so wide and diversified a region, but fertility is general. The rich delta of the Fraser is a perennial garden, and vegetables and fruits there reach an extraor-

dinary perfection. In the interior, light, dry soils prevail, which prove highly productive under irrigation and seem particularly rich in the Okanagan and Nicola districts. Arable regions are limited, however, and form a small part of the total area of the province. On the interior plateau the rainfall is insufficient for the growth of crops, and the rivers so generally flow through deep, narrow channels that the irrigable area is very limited. On the coast and elsewhere, where the rainfall is greater, the forest growth is usually so heavy that it requires great expense to clear and maintain land for cultivation. Wheat grows luxuriantly, but the kernel is too soft for milling purposes. Nevertheless, the southern portion of the province contains scattered districts admirably adapted to ranching and agricultural pursuits, and progress has been made in the delta and lower valley of the Fraser River and in the Okanagan district. In the latter region, especially, fruit farming and hop raising are attaining much importance, and the southern plateau and part of the interior are remarkably well adapted to the cultivation of these products, where labor necessary for picking the hops is supplied by the Indian population. In the late nineties the fruit-growing industry of the Fraser valley suffered much from the prevalence of fungous diseases affecting trees and fruit. Considerable market gardening is engaged in by the Chinese in the neighborhood of the larger towns. The pastures of British Columbia are proving valuable. On the Cariboo road (between Soda Creek and Quesnel), there is a plain 150 miles long, and 60 or 80 wide; and between the Thompson and Fraser rivers there is an immense tract of grazing land. The creamery system has been introduced.

Flora and Forests. The flora is distinctly of a northern type, and the forest resources of the province rank next to the mineral wealth in importance. British Columbia probably contains the largest unbroken area of merchantable forests on the continent. The western slopes of the mountains, particularly the coast ranges, are covered with a dense growth of forest trees which attain remarkable proportions. On the eastern slopes the forests are not so dense nor the trees so large, while much of the interior plateau is well-nigh treeless. The lower Fraser country especially is densely wooded. Smaller streams and the numerous inlets and arms of the sea give access to extensive forests all along the coast. Owing to the very limited Pacific coast market, the forest resources have as yet been but little drawn upon. There are over 100 saw mills in the province, and the lumber cut of 1911 aggregated 1,100,000,000 feet. The most abundant and valuable species is the Douglas fir. On the coast it sometimes attains a height of 350 feet. The white cedar is also widely distributed and is extensively used for shingles and for finishing purposes. The yellow cedar is also of great commercial value. The dense forests of spruce and hemlock north of Knight's Inlet afford an almost inexhaustible supply of pulp wood of a superior quality. The precipitous coast streams supply all the power necessary for carrying on the pulp-manufacturing industry, and arrangements have been made looking to its establishment.

Fauna. The animals of British Columbia are those of the Northwest generally. Wapiti remain only along the eastern foothills of the

Rocky Mountains, but moose, black-tailed deer, and caribou are abundant throughout the valleys everywhere, while the bighorn abounds upon the alpine pastures of the Rocky Mountains and the white goat frequents the summits of the Coast Range. Bears, wolves, and wildcats are known everywhere. Fur-bearing animals are numerous, and in the northern part a great trade in the collection of peltries from Indian trappers is still carried on. This province presents more big-game attractions than almost any other part of North America, and excellent game fish abound in all its streams.

Geology. Over large areas the geology of British Columbia has been studied only in a general way, although more detailed studies have been made of the regions of economic interest. In the Rocky Mountains Archæan rocks are represented by granites, gneisses, and schists, which underlie immense thicknesses of Paleozoic strata ranging from the Silurian to the Carboniferous. Jura-Trias beds are found overlying the Paleozoic in places. At the close of the Triassic the first upheaval took place in the Gold Range and in the highlands of Vancouver and Queen Charlotte Islands. Cretaceous rocks are found along the coast and probably also along the upper course of the Skeena and the lower Nechacs rivers. They hold valuable coal deposits where they outcrop on Queen Charlotte and Vancouver islands. Tertiary strata occur in the southwestern coast region. In the interior of British Columbia between the Rocky and Coast ranges there are areas occupied by limestones, quartzites, serpentines, and igneous rocks, the age of which has not been determined. A large part of British Columbia is mineralized, and gold, silver, lead, and copper ores are wrought in numerous localities. Rossland, Kaslo, Yale, Nelson, Slocum, Trail, and New Denver are important centres of mining industry. Auriferous gravels, resulting from the erosive action of glaciers and rivers, are of widespread occurrence and yield considerable quantities of gold.

Mining. Mining is the principal industry of the province. Placer mining for gold was carried on as early as 1858 along the Fraser River and its tributaries. In 1893 the output reached \$3,900,000, a large part being obtained from the northern interior, about the headwaters of the Fraser, called the Cariboo district. The output then diminished, reaching the minimum of \$379,535 in 1893. The introduction of hydraulic methods and machinery produced a revival of the industry, so that in 1905 the product was valued at \$5,902,402, over four-fifths of which was obtained in lode mining, and, in 1912, \$5,205,485. Silver and lead are obtained from the same ores in the southeastern part of the province, and they have consequently had a parallel development. The silver output increased in value from \$73,000 in 1890 to \$1,972,000 in 1905, while the value of the lead for the latter year amounted to \$2,390,000. The silver output in 1912 amounted to \$1,612,737. The mining of copper is of more recent development. This, too, is obtained from the southeastern portion of the province, where extensive operations began about 1890 in the Kootenay district. From \$111,000 in 1890, the value of the output increased to \$5,876,000 in 1905. The output of coal rose from 90,000 tons in 1874 to 1,384,000 tons in 1905, valued at \$4,153,000; production in 1912, 3,221,000 tons. It is mined

chiefly in Vancouver Island. Vast resources of coal exist in the foothills of the Rockies. The total value of the mineral production of British Columbia up to and including 1905 was as follows: gold, \$104,138,000, silver, \$23,689,000, lead, \$14,058,000, copper, \$27,258,000, coal and coke, \$73,787,000, building stone, etc., \$4,560,000, other minerals, \$253,000, total, \$248,643,000. In 1911 the total mineral production was valued at \$23,499,072, in 1912, \$32,440,800, higher than the value produced in any previous year.

Fisheries. The enormous quantities of fish which frequent the coast waters and streams are another important source of wealth to the province. British Columbia, which formerly was second to Nova Scotia alone in the importance of her fisheries, took first place in 1912. The yield of the fisheries amounted to \$104,000 in 1876, \$1,454,000 in 1881, and \$9,850,000 in 1905, in 1911 and 1912 the yield was valued at \$9,163,235 and \$13,677,125, as compared with \$10,119,243 and \$9,367,550 for Nova Scotia. Salmon is the most valuable fish product of British Columbia, and the value of the yield in 1911 was \$6,744,132, or about three-fourths of the total. The salmon fisheries are most extensive along the Fraser River. Restrictions on salmon fishing obtain, but they are insufficient for the best interests of the industry. Seal fishing is not so important as in former years. The catch increased from 9700 in 1898 to 16,400 in 1900, but declined in the following year to 7200 and in 1903 to 3800, in 1911, 4232, valued at \$118,406. Halibut is next in value to salmon (yield, in 1911, \$1,095,315), herring, cod, smelts, and oysters are among the fishery products.

Manufactures. In 1910 there were 651 manufacturing establishments with an invested capital of \$123,027,521, employing 33,312 hands, paying \$17,240,670 in salaries and wages, and a product valued at \$65,204,236. In 1900 there were 392 manufacturing establishments with an invested capital of \$22,901,892, employing 11,464 hands, paying \$5,459,538 in wages, and a product valued at \$19,447,778. In Vancouver and Victoria, the two largest cities, the value of the manufactured products in 1910 as compared with 1900 increased by 202.30 and 50.19 per cent respectively.

Transportation and Commerce. The transportation facilities of British Columbia have not been fully developed. Communication with the East is, however, established by means of the Canadian Pacific Railway, which crosses the province and is connected at two points with the railroad system of the United States. The same company has a branch route from the coast into the Kootenay region, where the short lines and steamboat routes connect the various mining towns. The western division of the Transcontinental Railway was in operation in 1912 from Winnipeg (Manitoba) to points in British Columbia, but connection with its western terminal, Prince Rupert, had not been completed. Eleven branch lines were under construction in 1912. The railway mileage of the province on June 30, 1912, was 1855. Steamers ascend the Fraser as far as Fort Yale, and others run upon its upper waters and on Lake Okanagan, etc., but the interior is dependent for transportation mainly upon stage lines. In 1913 there were 13,000 miles of standard highway and 15,000 miles of trails, serving a rural population estimated at over 200,000.

Owing to the mountainous nature of the province, the construction of roads and trails involves much skill and daring and labor. Telegraph and mail routes penetrate to all civilized parts of the province. The total imports and exports in 1902 were valued at \$10,391,256 and \$18,355,335, in 1912, \$49,345,161 and \$20,272,840.

Government. British Columbia is represented in the Canadian Parliament by three senators and seven members of the House of Commons. The provincial government is administered by a lieutenant governor (appointed by the governor-general of Canada) and the Legislative Assembly (42 members elected for four years). The lieutenant governor is assisted by a ministry, the Executive Council, responsible to the Assembly. Revenue and expenditure in 1910, \$8,874,741 and \$6,549,994, in 1911, \$10,492,892 and \$5,414,825. Net debt (1911), \$1,497,694.

Banks. The clearing-house transactions of Victoria in 1912 amounted to \$183,544,238, and those of Vancouver to \$645,118,887. The province contains post office and government savings banks.

Education. In 1911, of the population five years of age and over (350,745), 314,183 (89.07 per cent) could read and write. There are free public schools, and, differing from most Canadian provinces, they are wholly under secular control. The system comprehends common, graded, and high schools, with a total teaching force of over 1100, in 1911 pupils numbered 45,125. There are also a number of private schools. Expenditure in 1911, \$2,641,522, of which \$715,734 was for education proper. In 1912 the University of British Columbia, a provincial institution, was endowed by the government with 2,000,000 acres and also with a site of 217 acres at Point Grey, near Vancouver. McGill University College of British Columbia, a branch of McGill University of Montreal, has buildings at Vancouver and Victoria. There is a provincial normal school at Vancouver. Ryerson College (Methodist), Latimer Hall (Anglican), and Westminster Hall (Presbyterian) are in affiliation with the University of British Columbia, but their degree-conferring power is restricted to graduates in divinity. Okanagan College (Baptist) is at Summerland.

Religion. The leading religious denominations in 1911 were Church of England, 100,952, Presbyterian, 82,125, Roman Catholic, 68,397, Methodist, 52,132, Lutherans, 19,362, Baptist, 17,228, Oriental religions, 25,808.

Population. The population of British Columbia was 36,247 in 1871, in 1881, 49,450, in 1891, 98,173, in 1901, 178,657, in 1911 (census of June 1), 392,480, the increase in the last decade being 110.68 per cent. Of the total in 1911, persons of English origin numbered 133,186, Scotch, 74,493, Irish, 40,642, other British, 4362, German, 11,380, Italian, 9721, French, 8907, Austro-Hungarian, 7015, Scandinavian, 15,968, Chinese, 19,568, Japanese, 5857, American Indian, 20,134. There were 25,370 unspecified. The increase in Chinese from 1901 to 1911 was 4683 (increase for all Canada, 10,462). Males numbered in 1911, 251,619, females, 140,861, rural population, 183,706, urban, 203,684. Birth rate, in 1911, 14.88, death rate, 9.39.

Victoria, the capital, containing a population of 31,660 in 1911, is situated in the southern extremity of Vancouver Island. Vancouver, the largest city, with 100,401 inhabitants (27,010 in

1901), is situated on the coast of the mainland. Of the other cities, the largest are New Westminster (13,199 in 1911), Nanaimo (8306), Nelson (4476), Prince Rupert (4184).

Indians. The census of 1901 gives the Indian population as follows: West Coast Agency, 2750; Fraser River Agency, 3380; Babine and Upper Skeena Agency, 2783; Williams Lake Agency, 1899; Northwest Coast Agency, 3094; Kootenay Agency, 562; Cowichan Agency, 2020; Kamloops Agency, 2880; Okanagan Agency, 651; Kwawkwewit Agency, 1639; bands not counted, about 2500; making a total of 25,068. The total as returned by the 1911 census was 20,134. The influences of civilization are thought to have arrested the rate of decline, and there is even an increase in some of the tribes. The status of the coast tribes of British Columbia presents a number of contrasts with that of the Indians of the interior plains and regions farther east. Food is more abundant, the climate is milder, and the Indian is more industrious, and consequently famines are almost unknown, although no financial assistance is now given. Many Indians now own comfortable houses. Land is set aside for them, which they are not allowed to sell without permission from the government. They are not obliged, however, to remain on these reservations, but may acquire property elsewhere, and under certain conditions are admitted to the rights of franchise. Acts passed by the Indian chiefs and councillors may be enforced if approved by the government. Their interests are protected by the Indian Department of the Dominion government. The 1901 census returned 6769 as Protestant and 12,628 as Catholic. The Indian schools are conducted on denominational lines.

History. Captain Cook, the famous explorer, visited a part of the coast of British Columbia in 1778, and 10 years later an English settlement was established at Nootka by Capt. John Meares, formerly a Lieutenant in the British navy, though it was almost immediately broken up by the Spanish, who claimed the whole coast as far as the Russian possessions, on the basis of prior discovery. For some time war appeared imminent between England and Spain, but in 1793 the difficulties between the two courts were settled by arbitration, England receiving all the northwest coast from Nootka Sound to the Russian trading posts in Alaska. Meanwhile, in 1792, Capt. George Vancouver (q.v.) circumnavigated the island which bears his name, besides exploring a part of the coast of the mainland; and in 1793 Alexander Mackenzie (q.v.), a partner in the Northwest Company, reached the coast of the present British Columbia after an arduous overland journey from Lake Athabasca. For many years the territory now included within the province formed part of "New Caledonia," throughout which the Northwest Company and later the Hudson's Bay Company (with which the Northwest Company was amalgamated in 1821) carried on trading operations; and in 1843 a fort was built by the Hudson's Bay Company on the site of the present city of Victoria. A considerable portion of the territory at this time was claimed by the United States, on the strength of the Louisiana Purchase, and feeling ran high, giving origin to the campaign cry of "Fifty-four forty or fight." But under Polk the matter was arbitrated.

In 1849 Vancouver Island was erected into a crown colony, though it remained under the vir-

tual control of the company, Sir James Douglas occupying both the position of Governor and that of the company's chief factor. In 1856 an assembly was called, though the island was still only sparsely settled. Gold was discovered in the bed of the Fraser River in 1856, and, settlers having arrived in some numbers, New Caledonia was also organized as a crown colony in 1858 under the name of British Columbia, of which also Douglas acted as Governor for several years. In 1863 an Act was passed by the British Parliament establishing as the boundaries of the colony the Pacific Ocean and the frontier of the Russian territory in North America to the west, the 60th parallel of north latitude to the north, the 120th meridian of longitude and the summit of the Rocky Mountains to the east, and the northern boundary of the United States to the south. The two colonies were united under the name "British Columbia" in 1866, and five years later the new province thus created was admitted into the Confederation of Canada, the Dominion government pledging itself to pay a considerable subsidy to the province and to secure the construction within 10 years of a railroad connecting the seaboard of the province with the main railway system of Canada. The road, however, was not completed until 1885. Soon after its admission into the Dominion British Columbia secured a constitution under which a government was organized similar to those of the other provinces. The southern, southwestern, and northwestern (Klondike) boundaries of British Columbia have at various times formed the subject of considerable controversy between the United States and Great Britain. See OREGON; SAN JUAN BOUNDARY DISPUTE.

The course of political development under Confederation was not at first in accordance with parliamentary or responsible government. Previous to 1903 governmental administration was more or less personal, the premier and his associate ministers not being strictly accountable to the legislature and often at variance in matters of policy. In that year this condition, which had affected the preceding administrations of John Herbert Turner (q.v.), James Dunsmuir (q.v.), and Edward Gawler Prior, was eliminated by the formation of a Conservative government under Mr. (afterward Sir) Richard McBride (q.v.), and the principle and practice of party government have since been accepted. The change was effected during the lieutenant-governorship of Sir Henri Gustave Joly de Lotbinière (q.v.), who was appointed in 1900. The McBride administration has been in office since 1903, and at the close of 1913 was stronger than ever before in public confidence. The most important questions for many years have been: the demand for "better terms," i.e., increased aid from the Dominion treasury; the need of more railways; Asiatic immigration; and the development of the mining, fishing, and agricultural industries. The Conservative and Liberal parties, together with a sprinkling of Socialists and Laborists, have fought their contests mainly on these questions. During the past 10 years the judicial and educational systems have been efficiently organized, the latter including a provincial university at Vancouver, with affiliated colleges. The demand for "better terms" which the administration of Sir Wilfrid Laurier (q.v.) did not meet with satisfaction to the province, reached in 1907 a more advantageous stage by direct appeal to the Secretary of State for the

Colonies in London, with the prospect of ultimate success. In 1912 the Dominion government, then under the Conservative leadership of Robert Laird Borden (qv), promised to appoint a royal commission to investigate the claims of British Columbia in this regard.

Legislative measures prohibiting Asiatic immigration were enacted by Premier McBride, but were disallowed by the Dominion government as conflicting with national and Imperial policy. With regard to the Japanese, the difficulty was in part removed, on Jan. 1, 1901, by the government of that people, which forbade the emigration of its subjects to Canada. A treaty was also arranged between Great Britain and Japan. (See CANADA, History.) Also in 1903 the Dominion government imposed a heavy poll tax on Chinese immigrants. Nevertheless, the people of the province have continued to look upon the presence of Asiatics, including Sikhs and others from India, as obnoxious. Certain measures were admittedly hastened by the pressure of a small but influential Socialist party. Among them were an eight-hour day for miners working underground (1905), and also for smelters (1907). In 1912 an important report by a commission on taxation recommended a general reassessment, with the view of creating an equitable valuation of land and incomes so as to lower the general rate of taxation. In the same year legislation for the construction of 795 miles of railway was introduced. Labor troubles during the last few years have played an important part. The Industrial Workers of the World made a determined attempt in 1912 to establish their organization in the province. Over 150 of their members were turned back at the frontier, but others succeeded in meeting railway men to strike. A riot, which was quickly suppressed, occurred at Vancouver, and scenes of violence in other places were reported. Several offenders were convicted and received severe sentences. Men were brought in to replace the strikers. In 1906 James Dunsman was appointed Lieutenant Governor, and in 1909 he was succeeded by Thomas Wilson Paterson. The loyalty of the people to British connection was manifest in the enthusiastic reception given to the Duke of Connaught (qv), Governor-General of Canada, during his visit (in which he was accompanied by the Duchess of Connaught) to the province in 1912.

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BRITISH EAST AFRICA. A geographical, not an administrative, term applied to that portion of eastern Africa included within the sphere of British influence and extending from German East Africa to Abyssinia and the Anglo-Egyptian Sudan, and from the Juba River and the Indian Ocean to the Belgian Congo. See ZANZIBAR, UGANDA, EAST AFRICA PROTECTORATE.

BRITISH ECONOMIC ASSOCIATION. See ROYAL ECONOMIC SOCIETY.

BRITISH EMPIRE. The United Kingdom of Great Britain and Ireland and all other territories subject to the ultimate control of the Parliament at London. The territories outside of the United Kingdom are styled, in general, either colonies or protectorates. The colonies are immediate possessions of the United Kingdom and have laws and institutions essentially British, each being administered by a governor (of varying official designation) appointed by the crown; the protectorates retain the native government, which, however, is supervised or even controlled by a British official, a "resident" or "adviser." This resident has power to restrain all acts on the part of the native authorities deemed hostile to British interests or the welfare of the community and, in the last resort, to assume the government himself. Some of the African protectorates, especially East Africa and Nyassaland, are practically colonies.

The British colonies and protectorates may be classified as follows:

1. Colonies possessing responsible government, now known as self-governing dominions, in which the crown has reserved only the power of disallowing legislation, and the Secretary of State for the Colonies has no control of any public officer except the governor. In all matters affecting the internal welfare of such a colony the governor acts on the advice of ministers who are responsible to the legislature. In accordance with the established principles of British policy regarding the relations of the legislature and the executive, the crown exercises its power of veto only when the interests not merely of a single dominion, but of the Empire as a whole, are involved. The colonies of this class fall constitutionally into two groups: (1) the Dominion of Canada, the Dominion of New Zealand, the Union of South Africa, and Newfoundland, (2) the Commonwealth of Australia and its six component states (the Northern Territory, the Federal Capital Territory, and the Territory of Papua are administered by the Commonwealth).

II. Colonies not possessing responsible government (sometimes known as crown colonies), in which the administration is carried on by public officers under the control of the Secretary of State for the Colonies, and protectorates similarly

controlled. These dependencies comprise: (1) Colonies possessing an elected house of assembly and a nominated legislative council. These colonies are Bahamas, Barbados, and Bermuda. (2) Colonies possessing a partly elected legislative council, the constitution of which does not provide for a majority of official members (i.e., members who are also executive officers of the colony). These colonies are British Guiana and Cyprus. (3) Colonies possessing a partly elected legislative council, the constitution of which provides for a majority of official members. These colonies are Fiji, Jamaica, Leeward Islands, Malta, and Mauritius. (4) Colonies and protectorates possessing a legislative council nominated by the crown (in all the legislative councils in colonies of this class, except British Honduras, the constitution provides for a majority of official members). These colonies and protectorates are British Honduras, Ceylon, East Africa Protectorate, Falkland Islands, Gambia, Gold Coast, Grenada, Hongkong, Nyasaland Protectorate, St. Lucia, St. Vincent, Seychelles, Sierra Leone, Southern Nigeria, Straits Settlements, and Trinidad and Tobago. The legislative councils of Gambia, Sierra Leone, and Southern Nigeria legislate for Gambia Protectorate, Sierra Leone Protectorate, and Southern Nigeria Protectorate respectively. (5) Colonies and protectorates not possessing a legislative council. These are Ashanti (protectorate administered by a chief commissioner under the government of the Gold Coast), Basutoland (protectorate administered by a resident commissioner under the direction of the High Commissioner for South Africa), Bechuanaland Protectorate, Gibraltar, Northern Nigeria, Northern Territories of the Gold Coast (protectorate administered by a chief commissioner under the government of the Gold Coast), St. Helena, Somaliland Protectorate, Swaziland (administered by a resident commissioner under the direction of the High Commissioner for South Africa), Uganda Protectorate, Weihaiwei (leasehold), and islands under the High Commissioner for the western Pacific (including the Tonga, or Friendly, Islands, the Ellice and Gilbert groups, and the British Solomon Islands). In the foregoing colonies and protectorates, except Bahamas, Barbados, Bermuda, British Honduras, and the Leeward Islands, the crown has the power of legislating by order in council.

Not included in the classification above, but of proper place in an enumeration of the components of the British Empire, are the following: Northern Rhodesia and Southern Rhodesia (under the control of the British South Africa Company); the protected state of Brunei; the protected states of Johore, Kedah, Perlis, Kelantan, Trengganu, and the Federated Malay States; also the following possessions which are not administered under the Secretary of State for the Colonies: North Borneo, a protected state under the jurisdiction of the British North Borneo Company, Sarawak (protectorate), Zanzibar (protectorate), Aden (administratively a part of the Bombay Presidency), with Perim, Socotra, and other islands, Ascension, Tristan da Cunha, and other small islands. There must also be mentioned the Isle of Man (with a governor and a representative assembly) and the Channel Islands (with lieutenant governors and elective legislative bodies). There remains what in many ways is the most important of all the British possessions, an empire in itself, India.

It consists of "British territory" and "native states." The British territory is administered by the governor-general of India in council, appointed by the crown and subject to the Secretary of State for India at London, the native states are governed by their own princes, each under the control of a British resident (for details of government, executive and legislative, see INDIA, BRITISH). The independent states of Nepal and Bhutan are in some degree under British control.

Egypt, though under Turkish suzerainty, is virtually controlled by the British government, and the development of the country in recent years is due largely to the dominating influence of the British agent and consul general, minister plenipotentiary. The reclamation and development of the Sudanese provinces (the Anglo-Egyptian Sudan) have gone forward since 1890 under the condominium of the British and Egyptian governments.

In the case of colonies the officer appointed by the crown to administer the government is styled in accordance with the status of the colony, governor-general and commander in chief, governor and commander in chief, or captain general and governor in chief. In the case of protectorates (under the Secretary of State for the Colonies) the administrative officer appointed by the crown is styled either governor and commander in chief, high commissioner, commissioner and commander in chief, or commissioner.

The term "British Empire" must not be regarded as signifying so definite an entity as does, for instance, the term "Russian Empire." This is due in large measure to the wide dispersion of the British territories, to their heterogeneous elements of population, and to the diverse forms of government or degrees of autonomy possessed by them. From about 1880, however, the idea of British imperialism and solidarity has shown a notable development. This came into especial prominence at the time of the Boer War of 1899-1902 and has been emphasized by the proceedings of subsequent Imperial conferences and by the manifest desire of the great self-governing dominions to take an active part in Imperial defense.

The area and population of the British Empire are stated as follows, the figures for population being those of the census or estimates of 1911:

	Sq miles	Population
England	50,374	34,045,290
Wales	7,490	2,025,202
Scotland	30,405	4,700,904
Ireland	32,360	4,500,219
Total, United Kingdom....	121,105	45,251,615
Isle of Man	227	52,094
Channel Islands	75	95,900
British India	1,003,074	244,207,542
Native States	709,118	70,864,995
Total, India	1,802,192	315,132,537
Aden, incl. Perim (included above under British India)	80	46,165
Socotra	1,382	(a) 12,000
Straits Settlements	1,630	714,000
Ceylon (b)	25,332	4,106,350
Mauritius	720	368,791
Dependencies of Mauritius	89	6,600
Seychelles	156	22,601
Hongkong (c)	390	306,145
New Territories (d)	390	90,594
Weihaiwei	285	147,193

The table above includes the colonies and the African protectorates (except Zanzibar). The remaining protectorates include the following

	Sq miles	Population
Commonwealth of Australia		
New South Wales	309,460	1,646,734
Victoria	87,584	1,315,551
Queensland	670,500	605,313
South Australia	380,070	408,558
Western Australia	975,920	282,114
Tasmania	26,215	151,211
Northern Territory	523,520	3,310
Federal Capital Territory	912	1,714
Total, Commonwealth (e)	2,974,581	4,455,005
Territory of Papua	90,340	400,000
Dominion of New Zealand	104,356	1,008,468
Fiji	7,435	139,541
Falkland Islands	7,500	3,275
Union of South Africa		
Cape of Good Hope	276,995	2,564,965
Natal	35,371	1,194,043
Transvaal	110,426	1,686,212
Orange Free State	50,392	528,174
Total, Union	473,184	5,973,394
Swaziland	5,338	69,969
Basutoland	12,718	404,507
Bechuanaland Protectorate	275,000	125,350
Southern Rhodesia	148,575	771,077
Northern Rhodesia	291,000	(f) 822,599
Nyasaland Protectorate	39,801	970,430
East Africa Protectorate	245,000	4,038,000
Uganda Protectorate	(m) 223,500	2,843,325
Somaland Protectorate	68,000	344,323
St Helena	47	3,477
Ascension	84	400
West Africa		
Gambia (h)	3,619	146,101
Sierra Leone (h)	24,968	1,403,132
Gold Coast (h)	80,235	1,503,336
Southern Nigeria, Colony and Protectorate of	79,880	7,855,016
Northern Nigeria, Protectorate of	255,700	9,269,000
Total, West Africa	444,342	20,176,635
British America		
Dominion of Canada	3,729,665	7,206,643
Newfoundland	42,734	238,070
Labrador	120,000	3,949
Total, British America	3,892,399	7,440,262
West Indies		
Bahamas	4,404	55,944
Jamaica	4,207	831,383
Turk's and Caicos Islands	100	5,615
Barbados	160	171,982
Trinidad and Tobago	1,868	333,552
Leeward Islands Colony		
Virgin Islands	58	5,557
St Christopher	68	26,283
Nevis	50	12,945
Anguilla	34	4,075
Antigua, incl Barbuda and Redonda	170	32,269
Montserrat	32	12,196
Dominica	305	33,863
Windward Islands		
St Lucia	223	48,637
St Vincent (i)	140	41,877
Grenada (i)	133	66,750
Total, West Indies	12,084	1,682,935
Bermuda (e)	19	18,994
British Honduras	8,898	40,458
British Guiana (e)	90,500	295,041
Gibraltar (e)	174	19,556
Malta (e)	117	211,564
Cyprus (e)	3,854	273,964
Grand Total	11,372,793	418,910,112

	Sq miles	Population
Malay Peninsula		
Federated Malay States	27,506	1,036,999
Johore	9,000	180,412
Kedah	3,800	245,986
Perak	240	32,746
Kelantan	5,870	286,752
Trengganu	6,000	154,073
Brunei	4,000	30,000
State of North Borneo	31,106	203,133
Territory of Sarawak	42,000	500,000
British Solomon Islands Protectorate	14,800	150,500
Gilbert and Ellice Islands protectorates	180	31,121
Tonga, or Friendly, Islands Protectorate	390	21,695
Zanzibar Protectorate	1,020	198,914
Total	145,912	3,075,451

Various small Pacific islands are attached to New Zealand or the Solomon, Gilbert, and Ellice, or Tonga protectorates. Pitcairn Island (area 2 square miles, pop, 144) is regarded as a colony. In addition there are various small islands which are British territory or are under British protection, but which are not included in any colony or protectorate. At the Bahrein Islands (pop about 90,000), in the Persian Gulf, is a British political agent. From the foregoing figures it appears that the total area of the United Kingdom and the territories under its administration or control (not including Egypt or the Anglo-Egyptian Sudan) is about 11,520,000 square miles, with a population (1911) of over 422,076,000. The actual population figure is even somewhat larger than this, for the census returns of the United Kingdom do not include the army, the navy, or merchant seamen abroad, also some of the colonial returns do not include the military or persons on board ships in harbors.

Bibliography Lucas, *An Historical Geography of the British Colonies* (a series of volumes, London, 1888 et seq.), Dilke, *Greater Britain* (2 vols, London, 1869), id, *Problems of Greater Britain* (ib, 1890), id, *The British Empire* (ib, 1899), Sanderson, *The British Empire in the Nineteenth Century* (6 vols, London, 1898), Egerton, *A Short History of British Colonial Policy* (ib, 1897), Seeley, *The Expansion of England* (ib, 1883), id, *The Growth of British Policy* (2 vols, ib, 1895), Jebkyns, *British Rule and Jurisdiction beyond the Seas* (Oxford, 1902), Payne, *Colonies and Colonial Federations* (ib, 1905), Goldman and others, *The Empire and the Century* (1905).

BRITISH GUIANA. See GUIANA.

BRITISH GUM. A name given commercially to dextrin (q.v.).

BRITISH HONDURAS. A British crown colony in Central America (Map Central America, C 2). It is bounded by Guatemala on the south and west, Mexico on the northwest, and the Caribbean Sea on the east, and covers an area, including numerous cays, of 8598 square miles. The coast is, as a rule, low and swampy, and a large part of the interior is covered with forests yielding large quantities of mahogany and logwood. The climate is hot, moist, and generally unhealthy for Europeans. Over 50,000 acres are under cultivation and yield fruits, rubber, coffee, etc. Estimated area-

(a) Estimated population 1910. (b) Excluding the military and persons on ships in harbors. (c) Population excluding the military. (d) The New Territories and Weihaiwei were leased to the British government in 1898. In 1904 a part of the New Territories (New Kowloon) was placed under the jurisdiction of the Hongkong Sanitary Board, and since that date the area (13 square miles) and the population (13,693 in 1911) have been included in the figures for Hongkong. (e) Exclusive of full-blooded aborigines, estimated at 100,000. (f) Partly estimated. (g) Including the area of the lakes and river Nile within the protectorate. (h) Including the protectorate districts. (i) Including part of the Grenadines.

age of worked mahogany and logwood forest, 2,615,000, yielding 13,020,580 superficial feet of mahogany and 3231 tons of logwood in 1911. Of cedar, 1,543,744 superficial feet were exported in 1911. In order to open up the country the government in 1904 sold to B. Clupley, an American, at one cent per tree, all pine trees on crown lands. Total imports in 1911, \$2,886,077 (\$1,227,903 in 1902); total exports, \$2,685,849 (\$1,302,210 in 1902). The fruit export was 2,653,445 plantains, 5,198,999 coconuts, 450,365 bunches of bananas. Exports of sapodilla gum, 3,219,990 pounds; rubber, 24,192 pounds; sponges, 9822 pounds; tortoise shell, 3367 pounds. About 25 per cent of the commerce is with Great Britain. The revenue, derived chiefly from taxes, duties, and sale and letting of crown lands, was \$1,201,908 in 1911-12; the expenditure, \$532,123. The public debt amounted at the end of 1911 to \$946,415. The colony is administered by a governor, and has an executive and a legislative council. United States gold currency was adopted as a legal tender in 1894. Pop., census of 1911, 40,458; about 600 are whites, the rest being negroes, mulattoes, and Indians; in 1901, 37,479. The capital, Belize, is a busy port, with an extensive shipping and a population in 1911 of 10,478. The colony was first settled at the beginning of the eighteenth century by the Scotch adventurer Wallis, from whom it is supposed to have received its original name of Belize (Balize). Spain made numerous attempts to expel the early British settlers from the colony, and it was not until 1798 that a treaty was concluded which permitted peaceful development of the country; and not till 1896 was Great Britain entirely confirmed in its possession.

BRITISH INDIA. A term used to designate the districts of India under direct British administration, in contradistinction to the native states under British protection. The area of British territory is stated at 1,093,074 square miles; native states, 709,118 square miles; total India in British possession or under British control, 1,802,192 square miles. Pop. of British territory in 1911, 244,267,542; native states, 70,864,995. See INDIA.

BRITISH MUSEUM. An important national institution in London. By the will of Sir Hans Sloane (q.v.), his great natural history and art collections, with a large number of books and manuscripts, were in 1753 offered to the government for £20,000, the first cost having been over £50,000. The necessary funds were raised by a lottery, and the collection, together with the Harleian and Cottonian libraries (the latter of which, presented to the nation in 1700, was the real beginning of the museum), bought for the purpose. The institution was established in Montague House, which was opened in 1769 under the name it now bears. The acquisition of new collections made enlargement necessary; and finally, in 1823, the eastern wing of the present building was erected, to receive the library of George III. The completion of the structure was delayed, however, until 1847. It is a hollow square, Ionic in architecture, with an imposing façade 370 feet long on Great Russell Street, flanked by the residences of the chief officers. The principal subsequent addition was the splendid reading room erected (1854-57) within the quadrangle, at a cost of £150,000. It is circular in form, with a dome

106 feet in height and 140 in diameter. The library of the museum contains over 3 miles of bookcases, 8 feet high, which is equivalent to space for 1,000,000 octavo volumes. The reading room proper in the dome contains 60,000 more. It has accommodation for 200 readers, and in details of arrangement, ventilation, etc., is admirably adapted to its purpose, thanks very largely to the unwearied care of Sir Antonio (then Mr.) Panizzi (q.v.), the principal librarian, during its construction. When the natural-history departments claimed more space, a new building was erected for their exclusive use in Cromwell Road, near the South Kensington Museum, at a cost of nearly £400,000. To this, which has been in use since 1881, the zoological, mineralogical, geological, and botanical departments were transferred, all very rich in specimens and constantly expanding. In 1873 and 1888 the main building was also considerably enlarged for the benefit of the departments of Greek sculpture and of prints; and in 1895 several acres of ground adjoining were secured for future extension, which has now (1913) been completed.

Only a brief account can be given of the wealth of collections contained in the museum. They were originally arranged in three departments—printed books, manuscripts, and objects of natural history. There are now eight departments in the museum proper. Access to the library is granted by the issuing of a reader's ticket, on a written application accompanied by the recommendation of a London householder. The total number of persons visiting the general collections in 1911 was 723,571. Those using the library during the same year numbered 223,404. The total number of volumes supplied during the year closely approximated 1,500,000 volumes, exclusive of the 20,000 volumes on the open shelves.

Printed Books.—This is the largest department and, from Sir Hans Sloane's original collection of 50,000 volumes, has grown to enormous proportions, by purchase, bequests, and donations. Under the Copyright Act of 1842 it receives a copy of every book published in England. The annual increase from all sources is nearly 50,000 volumes, and the total number of printed books is now between 3,500,000, and 4,000,000, which is hardly exceeded by the Bibliothèque Nationale in Paris. The old manuscript catalogue, which used to extend to some 3000 volumes, has at last been superseded by a printed one, begun in 1881 under the supervision of the learned librarian, Dr. Garnett, and requiring about 600 volumes. The most extensive and valuable additions have been the royal collections given by the last three Georges, David Garrick's collection of plays (1779), the natural-history library of Sir Joseph Banks (1820), and the Grenville collection (1847). Over 50,000 printed and 20,000 manuscript maps form a special subdepartment. In 1912 Alfred H. Euth bequeathed 13 illuminated manuscripts and 37 rare books to the museum's collection, which constitutes the most valuable gift made to it since the Grenville Library.

Manuscript Department.—This now contains upward of 55,000 volumes, besides charters, seals, and Egyptian, Greek, and Roman papyri. It includes the Cottonian manuscripts (see COTTON, SIR ROBERT BRETOM), rich in documents relating to English history; the Harleian collec-

tions (see HARLEY, ROBERT), specially rich in illuminated and classical manuscripts, those from the royal library given by George II in 1757, and containing, among other very valuable things, the Codex Alexandrinus (q.v. under BIBLE), the Psalterion of James I in his own handwriting, and many priceless literary autographs. The most important recent additions to this department are the Stowe manuscripts, purchased from Lord Ashburnham, and 430 volumes of the Duke of Newcastle's papers.

There is a separate department of Oriental printed books and manuscripts, established in 1892, and the former antiquities department, dating from 1807, was in 1861 divided into the three which follow.

Greek and Roman Antiquities—Sir Hans Sloane's small collection was the nucleus of this department, which for a number of years made slow progress. In 1772, by the purchase of Sir W. Hamilton's collections, a number of important vases were secured, and at the end of the same century the Dilettanti Society (q.v.) gave the results of their expedition to Ionia. In 1805 the collection of Greek Roman sculpture formed by Charles Townley was purchased for £20,000, to be followed in 1814 by the Townley collection of bronzes, gems, and coins. In the same year the frieze of the temple of Apollo at Bassæ (see PHIGALIAN MARBLES) was purchased. It was, however, in 1816 that the most valuable accession reached the museum, in the shape of the Elgin Marbles (q.v.), purchased for £35,000, and including the statues and reliefs from the Parthenon. Since then the display of sculpture has been increased by the Lycian monuments brought back by Sir Charles Fellows (1842), and by the results of the excavations at Halicarnassus, Cyrene, Ephesus, and Priene, as well as by the purchase of collections and single monuments. To the vases and small objects have been added the Burgon and other collections, including a valuable series of vases from Camiros and Naukratis. The collection of gold, silver, and gems was greatly enriched by the addition of the Castellani collections in 1872-73. This department was enriched by three most important accessions during 1911.

Coins and Metals—This department, whose beginning came from the Cotton and Sloane collections, has grown to be a large and interesting department, arranged as Greek, Roman, Mediæval and Modern English, and Oriental. In 1872 £10,000 were spent in purchasing the finest Greek and Roman specimens of the Wigan collection. In 1911 a collection of 2600 coins (173 in gold) was added to this department through the generosity of Henry van den Bergh.

Egyptian and Assyrian Antiquities (until 1881 called Oriental Antiquities)—This collection began with the antiquities which fell into British hands at the capture of Alexandria in 1801, but its most valuable acquisitions date from the middle of the century and are due to Layard, Rawlinson, George Smith, and other famous explorers. It is now a singularly complete and varied collection of Egyptian, Babylonian, Assyrian, Phœnician, and Semitic antiquities. Considerable accessions were made in 1911 of scarabs of the Hyksos period, Coptic and Illyrian antiquities, etc.

British and Mediæval Antiquities and Ethnographic Collections—This was made a separate department in 1866, and contains all ob-

jects of this nature found in the British Isles, and others which throw light on life in the Middle Ages. The Christy and Slade collections have added much to its value. A large number of accessions, due to the generosity of private benefactors, were made to this department of the museum in 1911.

Prints and Drawings—This magnificent collection, one of the most complete and valuable of its kind, is arranged in schools, according to the different styles of national art, now including the Japanese, and comprises original drawings of the old masters, etchings, and engravings. The most recent addition of prominence is the famous collection of John Malcolm. In 1911 the accessions of this department included a considerable number of rare German woodcuts and engravings, a collection of studies of birds and animals, and a large number of drawings, etchings, and engraved portraits—all the gifts of private benefactors.

The expenses of the maintenance and enlargement of the museum are paid out of the national treasury. For 1912-13 the administrative expenses of the museum are estimated to exceed £205,000. The whole system of arrangement facilitates the use of its collections by students, excellent catalogues and handbooks exist, and, as far as possible, all objects are clearly labeled. Its educational value is very great, and that it is appreciated is shown by the fact that, in 1911, 659,786 persons visited the museum on week days alone, while those who used the reading room averaged 745 daily. One of the new departures made recently is the engagement of official guides, who conduct parties through the museum free of charge and explain its most interesting features.

BRITISH NAVY See GREAT BRITAIN

BRITISH SOMALILAND See SOMALILAND, PROTECTORATE

BRITISH WEST INDIES A political division of the West Indies, comprising Jamaica and almost all the smaller islands of the Antilles, with the exception of a few small islands belonging to France, Denmark, and the Netherlands. They are divided into the following groups.

GROUPS	Area Sq. miles	Population
Bahamas	4,404	55,944 (1911)
Barbados	166	171,592 (1911)
Jamaica with Turks, Caicos, and Cayman Islands and Morant and Pedro Cays	4,424	831,333 (1911)
Leeward Islands	715	157,139 (1911)
Trinidad with Tobago	1,368	339,093 (1911)
Windward Islands	*527	*164,150 (1911)
Total	12,105	1,680,651

* Including Grenada, St. Vincent, St. Lucia, and Curacao.

These groups are subdivided into administrative units with different forms of government. The chief means of subsistence with all of them is agriculture, sugar and fruit constituting the staple products. The population consists mostly of negroes and mulattoes. For more details, see articles on the separate islands and groups. Consult Jay, *A Glimpse of the Tropics* (London, 1900); Fiske, *History of the West Indies* (New York, 1899); Root, *The British West Indies and the Sugar Industry* (London, 1899); Report of

the West India Royal Commission (ib., 1897); Rodway, *The West Indies and the Spanish Main* (ib., 1896); Macmillan, *The West Indies* (ib., 1909); Oliver, *Caribbean* (ib., 1910-12).

BRITO CAPELLO, bré'tôô kâ-pêl'ôô, HERMENEGILDO AUGUSTO DE (1839-). A Portuguese naval officer and African traveler, born in Lisbon. He became a captain in the royal navy in 1880. In 1877 he was sent by the government with Major Serpa Pinto and Roberto Ivens to explore the Portuguese colony of Angola. In order to make their expedition of greater scientific value, they decided to explore separate parts of Portuguese Africa; so while Serpa Pinto crossed Africa from Loanda to Durban, Ivens and Brito Capello (the latter of whom was already well known as a meteorologist) visited West and Central Africa, and explored the basin of the Kuango from the headwaters of that river to the Yaka district. They returned to Lisbon in 1880. With Ivens he was again dispatched by the government in March, 1884, to traverse the southern part of the continent from Portuguese West Africa (Angola) to Portuguese East Africa. He explored Amboella and the watershed between the Kongo-Lualaba and Zambezi rivers and directed his course along the Zambezi from Zumbo to Quilimane on the eastern coast, where he arrived in May, 1885. On both these journeys these two explorers made more than 60 astronomical determinations, and many magnetic and meteorological observations. They made also ethnographical, zoological, botanical, and mineralogical collections, and were rewarded in 1886 by the Paris Geographical Society which awarded them its grand gold medal for that year. The previous year they had both been honored in Madrid by splendid receptions and by honorary corresponding membership in the Madrid Geographical Society; and Brito Capello had been granted the Military-Naval Grand Cross. In collaboration with Ivens he wrote *De Benguella as terras de Jacca* (1881) and *De Angola á Contra-Costa* (1886). Each of these works is in 2 volumes and illustrated. In 1887 Brito Capello was appointed Portuguese Commissioner to discuss the boundaries of the Sultanate of Zanzibar and the colony of Mozambique. Later he was appointed Governor of the province of Loanda.

BRITO-FREIRE, bré'tôô frâ'râ, FRANCISCO DE (c.1620-92). A Portuguese soldier, naval officer, and historian. He became a captain of cavalry in the land forces, and in 1655 and 1656 commanded the fleet in the war which culminated in the expulsion of the Dutch from Brazil. He is best known for his *Nova Lusitania, Historia da Guerra Brasileira* (Lisbon, 1675), a rare and important work. He is also author of *Relação da viagem que fez ao Estado do Brasil a armada da companhia [do Commercio], anno 1655* (Lisbon, 1657).

BRITOMAR-TIS (Gk. *Borēmaptris*, translated by later Latin authors by *virgo dulcis*, sweet maiden, from Cretan *brity*, rich in blessing + *maris*, maiden). A Cretan female deity. Greek myth holds her to have been originally a nymph, daughter of Zeus and Carme, who drowned herself to avoid the embraces of Minos and was apotheosized by Artemis. According to another story she was not drowned, but fell into some fishermen's nets and was afterward deified as Dictynna (cf. Greek *δίκτυον*, *diktynon*, a net). She came to be regarded as the virgin patron of the chase, as Artemis was, and as

such is used by Spenser in the *Faerie Queene* to symbolize, in the form of a chaste huntress, Elizabeth, the Queen brave and unwedded.

BRITSKA (Russ. *britshka*, Pol. *bryczka*, dim. of *bryka*, a freight wagon). A long four-wheeled pleasure carriage, in use in Russia and Poland, so constructed as to give space for reclining at night, when used on a journey. The Polish *britska*, employed also in Russia, has a pole, a body of wickerwork, and a leather top. This type of carriage was introduced into Great Britain about 1818 and for a few years had an extraordinary vogue.

BRIT'TANY, Fr. **BRETAGNE**, bré-tá'ny' (from the *Bretons*, its inhabitants). Anciently **ARMORICA**. A peninsula of triangular form in the northwest of France (anciently a Roman province, subsequently a duchy, afterward again a province) nearly corresponding to the departments of Finistère, Côtes-du-Nord, Morbihan, Loire-Inférieure, and Ille-et-Vilaine. It has the English Channel on the north, the Bay of Biscay on the south, and the Atlantic Ocean on the west. The boundaries on the land side are the old provinces of Normandy, Maine, Anjou, and Poitou. The ancient duchy was diagonally divided from northwest to southeast into Haute and Basse Bretagne (Upper and Lower Brittany), the capitals of which were respectively Rennes and Vannes. The coast generally rises in rugged and lofty cliffs, but is indented with numerous bays which afford ample commercial advantages. Saint-Malo, Saint-Brieuc, Brest, Quimper, Lorient, and Nantes are important seaports. From the Montagnes d'Arrée and the Montagnes Noires, masses of granite in the northwest, the modern designation of Côtes-du-Nord—Northwest Hills—is derived. While not exceeding a height of 1150 feet, they give to the peninsula a bold and imposing appearance. The centre of the country is formed chiefly of clay slate. The scenery is varied and beautiful, and although the winter months are marked by fogs and violent wind storms, the climate generally is dry, bracing, healthful, and favored with much sunshine.

Large tracts of land lie uncultivated; but in the well-watered valleys, along the numerous rivers, and especially in the northern parts, modern methods yield abundant crops of all kinds, railway and steamboat transportation facilities giving a great impetus to agriculture. In the west and southwest agriculture is still in a primitive state, and there the tenacity with which the Breton clings to the customs and beliefs of his forefathers is especially apparent by his retention of the Celtic language, rich in folklore and an individual literature, and by his quaint, picturesque, and multi-colored sixteenth-century costume, always in evidence on Sundays and at festivals and fairs. The legends and traditions of the marvelous, which still influence the simple, superstitious native nature, are enhanced by the stupendous megalithic monuments of the Paleolithic Age which abound on the plains of Carnac, at Locmariaquer, Dol, and other localities throughout the region—relics of the pagan religion which existed as late as the seventeenth century, ritual traces of which secretly survive in remote parts. The Bretons are an Alpine or Celtic people, classed by Deniker, *Races of Europe* (1900), as dark, very brachycephalic, and short, and called by him the Western or Cévenole race (cranial index, 82.7; height, 1.63 meters). They have brown or black

hair, light or dark brown eyes, rounded faces and thickset figures. Traversed by railroads and fine highways, Brittany is a great resort for tourists—cyclists and automobilists especially being attracted by the combination of beautiful scenery and the archaic atmosphere of ancient monuments, castles, cathedrals, churches, and picturesque, if not particularly clean, villages.

History In ancient times Brittany, under the name of Armorica (q.v.) or Aremorica, was the seat of the confederated Armorican tribes who were of Celtic and Kymric origin. Traces of them remain in the old Kymric dialect of the three most westerly departments, and in the numerous so-called Druidical monuments already mentioned. The Armorici passed finally under Roman control in 61 B.C. Under the Romans the country was made the *Provincia Lugdunensis Tertia* and for two centuries was prosperous under the "Roman peace." But in the disorders of the third century A.D. it suffered severely and was reduced almost to a wilderness. It was repopled by numerous immigrations from Great Britain caused by the Anglo-Saxon invasions of the fifth and the sixth centuries, and then its name was changed from Armorica to Brittany—*Britannia Minor*. Monasteries were built, and settlements arose about them. Soon the Franks came into collision with the Bretons. From the time of Clovis (q.v.) to the death of Charlemagne there were frequent wars in which the Bretons were usually defeated, but never subdued. They paid tribute only when compelled by an armed force. Louis the Pious placed a native chief, Nomenoe, over the country in 818, and under his rule it prospered. After the battle of Fontenay, 841, Nomenoe took advantage of the weakness of the Carolingian monarchs to establish his independence, which was recognized in 846. From this time the rulers claimed the title of "Duke by the Grace of God." Brittany suffered severely from the invasion of the Northmen, but won a temporary respite by a brilliant victory in 891, when of 15,000 Northmen only 400 escaped. After 907, however, the Northmen renewed their attacks and reduced the country to the same desperate condition in which it had been in the fourth century, "Brittany destroyed," in the words of contemporary writers. Alain of the Twisted Beard (who died in 952) drove out many of the Northmen, but the country remained a prey to civil strife. In 992 Geoffrey, Count of Rennes, an ally of the Normans, took the title of Duke of Brittany, though the French King refused to acknowledge the legitimacy of the title till 1213. After the tenth century Brittany was closely associated with Normandy, and many Britons took part in the conquest of England. Under Henry II of England the Duke had to flee to England, and Henry took advantage of the opportunity to make his son Geoffrey Duke of Brittany in 1169. Geoffrey soon became the ally of the King of France against his own father. His posthumous son, Arthur, was the unhappy prince whom Richard the Lion-Hearted declared his heir, and King John was suspected of murdering, in 1203. After that Brittany became a vassal state of France, and in spite of frequent revolts remained so until about 1338. Then, when war broke out between England and France, the French King was glad to secure the Duke's aid "as an ally, not as a subject." During the Hundred Years' War Brittany was the ally alternately of each party and suffered exceedingly.

The question whether Brittany was a vassal state of France remained undecided and caused many wars. In 1491 the Duchess Anne, heiress of Brittany, married perforce Charles VIII. of France and the duchy was united to France. In 1499, however, when Anne married Louis XII., the successor of Charles VIII., the independence of Brittany was again fully recognized. After long discussion and many treaties the duchy was declared incorporated with France in 1532 by Francis I. Brittany retained a local parliament until the outbreak of the Revolution. During the Revolution Brittany, which was loyal to the Bourbons, was the arena of sanguinary conflicts, and especially of the uprising of the Chouans (q.v.), who reappeared as recently as 1832. Consult Borderie, *Histoire de Bretagne* (1896), Menpes, *Brittany* (New York, 1905), Raison du Cleuzon, *La Bretagne de l'origine à la réunion* (Paris, 1909).

BRITTLE, Mrs. The unfaithful wife of Barnaby and the title character in Betterton's *Amorous Widow*. The part was a favorite with Mrs. Bracegirdle, who, in 1706-07, at the Haymarket, chose it to show her histrionic powers, as contrasted with those of Mrs. Oldfield. For the cause and result of the latter remarkable contest, consult *Life of Mrs. Oldfield*, anonymous (London, 1730), Genest, *Account of the English Stage*, vol. II (Bath, 1832).

BRITTLE STARS (so called from being brittle or fragile). A class of starfish-like echinoderms, technically known as *Ophiuroidea*, excluding the basket fish (q.v.). The brittle stars are a widely distributed group of animals, like all the echinoderms, exclusively marine, found in all seas, but most abundant in the tropics and especially in the West Indian region. They are common at all depths, but are especially abundant in comparatively shallow water. None of them reach a very large size, few having the body or disk more than an inch in diameter, and the arms or rays are rarely 10 inches in length. In color there is the most extraordinary variety. While some are black, brown, dull olive, or even pure white, others are of the most gorgeous shades of green, blue, red, and yellow, or exhibit the most beautiful combinations of hues. In some the disk is smooth and the arms terete, with very short, flat, and appressed arm spines, in others the whole disk is covered with spines, sometimes short and opaque, but often long, slender, and glassy, and the flattened arms bear very long and beautifully transparent arm spines. In fact, the variety in the shape and covering of the disk and arms is quite as great as that in color. The arms, though flexible from side to side, are very slightly flexible up and down, and are therefore very easily broken. It is from this circumstance that the name "brittle star" has arisen. They are usually rather slow-moving animals, with little power of escaping from their enemies, and with no means of defense save such as the spines afford. Accordingly they live under rocks or buried in mud or sand, where there is little danger of their being seen. A few species, however, show considerable agility in escaping from an enemy and run about rapidly from rock to rock as they are pursued. They are practically all vegetable feeders or scavengers, though possibly some are carnivorous. About 600 species of brittle stars are known, of which only a few are found along the shores of the United States. About half a dozen forms

occur in shallow water along shore, north of Cape Hatteras, but south of that point they become very abundant. The Pacific coast forms are at present very slightly known.

BRITTON. The putative author of the earliest summary of the laws of England in the French language, all earlier treatises having been written in Latin. (See BRACON.) It was prepared in the last decade of the thirteenth century (probably 1292-94) and purports to have been written by the command of Edward I and speaks in his name. The author of the treatise is unknown, but he was probably a clerk or lawyer attached to the King's court, who sheltered himself behind the greater writer, whom we know as Bracton, but whose name was variously spelled Bratton, Bretton, or Britton, and whose work was largely drawn upon by the anonymous author of the present compilation. The latter is not a mere transcript of the greater work, however, but an original treatise of considerable value. An incomplete translation by Robert Kelham was published about the middle of the eighteenth century, and in 1865 appeared Francis M. Nichols's admirable edition, with an excellent translation, commentary, and learned introduction, published in London. Nichols's translation has been republished in the United States (Washington, 1902), with an introduction by Judge Simon E. Baldwin.

BRITTON, COLONEL. One of the principal characters in Mrs. Centlivre's comedy *The Wonder, a Woman Keeps a Secret*.

BRITTON, ELIZABETH GERTRUDE (1858-). An American bryologist, born in New York, a daughter of James Knight. Her early years were spent in Cuba. She graduated from the New York Normal College, where later she taught in the training department (1875-82) and was assistant botanist (1882-85). After her marriage to Nathaniel Lord Britton (q.v.) in 1885 she became editor of the *Bulletin of the Torrey Botanical Club* (1885-88). She continued the study of mosses, begun in 1880, and devoted much of her time to improving the collections of Columbia University and the New York Botanical Garden. She became known as a frequent contributor to botanical journals of papers on mosses and ferns.

BRITTON, HENRY DE. See BRACON.

BRITTON, JOHN (1771-1857). An English antiquarian, born in Wiltshire. His first literary work was a collection of popular songs. Then with Edward Wedlake Brayley (1773-1854), an enameleur, he compiled *The Beauties of Wiltshire* (vols. i, ii, 1801; vol. iii, 1825), the beginning of a series called *The Beauties of England and Wales*. He wrote *The Architectural Antiquities of England* (5 vols., 1805-26) and *The Cathedral Antiquities of England* (14 vols., 1814-32). He was a pioneer in the work of preserving "ancient monuments." He attempted (1848) to prove that Isaac Barré wrote the letters of "Junius." Consult his *Autobiography* (2 vols., London, 1849-50).

BRITTON, NATHANIEL LORD (1859-). An American botanist, born at New Dorp, Staten Island. He was educated at Columbia University, where he was assistant in geology (1879-80), instructor in geology, botany, and zoology (1880-90), and adjunct professor (1891-96). Having retired as professor emeritus in 1896, he became director in chief of the New York Botanical Garden. For five years he was a member of the New Jersey Geological Survey,

and in 1882 he served as field assistant on the United States Geological Survey. Besides editing the *Bulletin of the Torrey Botanical Club* (1888-98), he wrote *Illustrated Flora of Northern United States and Canada*, with Addison Brown (3 vols., 1896-98; 2d ed. rev. and enlarged, 1913); *Manual of the Flora of the Northern States and Canada* (1901; 2d ed., 1907); *North American Trees* (1908); *Studies in Cactaceae* (1913).

BRIVES-LA-GAILLARDE, brev'là-gà'yàrd' (Fr. joyful Brive, anciently, Lat. *Briva Curetia*, town on the Corrèze, from Celt. *bragh*, *brig*, heap, pile, elevation). A manufacturing town in the department of Corrèze, France, on a river of that name, situated about 18 miles southwest of Tulle (Map: France, S. F. 3). It is a beautiful city, with many interesting old houses and several churches (one of which, St. Martin, dates from the eleventh century), a college and a library. Near by are rock caves of prehistoric times. On account of its position it is a market of importance and does an active trade in vegetables, fruit, grain, wool, wine, live stock, and oil. There are manufactories of copper and tinware, paper, hats, wooden shoes, wax candles, and truffle pâtés, dye works, and quarries of slate and millstone. Pop., 1901, 17,049; 1911, 21,486. The Romano-Gallic name of the place was *Briva Curetia*. It is the birthplace of Cardinal Dubois.

BRIXEN (It. *Bressano*; anciently Lat. *Brivantes*, Gk. Βριζάντα, *Brivántai*, probably "mountaineers," from Celt. *brig*, elevation, hill). A town of the Austrian crownland of Tyrol, situated about 1835 feet above sea level, and about 60 miles east-southeast of Innsbruck, on the right bank of the Eisak at its confluence with the Rienz (Map: Austria, B. 3). It is an episcopal see and has a handsome episcopal palace, a fine cathedral, dating from the fifteenth century and containing the tomb of the Minnesinger Oswald von Wolkenstein, and several monasteries. The chief industry is the production of wine and the raising of fruit and grain. About 5 miles north-northwest of the town, is the fortress of Franzensfeste, commanding the Brenner Pass and the entrance to the Pustertal. Pop. of the district in 1910, 18,573. Brixen is mentioned in 901, and since 992 has been the capital of an episcopal see established in the fourth century.

BRIXHAM (AS. *brycg*, *brieg*, Ger. *Brücke*, bridge + *hām*, Ger. *Heim*, home, i.e., town of the bridge). A market town and seaport of Devonshire, England, beautifully situated on the south side of Torbay, 33 miles south of Exeter (Map: England, C 6). The town occupies the sides of two hills and is divided into two parts, called Upper and Lower Brixham. The prosperity of Brixham depends chiefly on its fisheries, it being the headquarters of the great Devonshire fishery of Torbay, in which many vessels are employed. Other industries include shipbuilding and the making of paint, ropes, and sails. The town is a much-frequented seaside resort. A cave discovered on Windmill Hill in 1853 is famous for the remains of prehistoric animals and man found there. It was at Brixham that the Prince of Orange (afterwards William III) landed, Nov. 4, 1688. Pop., 1871, 4941; 1891, 7078; 1901, 8000; 1911, 7054.

BRIXIA. See BRESCIA.

BRIZA. See QUAKING GRASS.

BRIZEUX, bré'zè', JULIEN AUGUSTE PÉLAGE

(1803-58) A French poet. He was born in Lorient, Bretagne, and in 1831 published his very successful idyllic poem, *Marse*. Most of his work derives its *motif* from the Bretagne country and rings freshly and sincerely. He wrote further *Les Ternaires*, afterward called *La fleur d'or* (1841), *Les Bretons* (1845), and *Ilistoves poétiques* (1855), the last two crowned by the Academy. His *Œuvres complètes* were published in 1870-84 (4 vols). C. Leconte published a life of Brizeux in 1898 (Paris).

BRIZURE, bié-zu', Brizé, or BRISÉ (Fr. *brisé*, from *briser*, to break). Terms used to indicate that a charge is bruised or broken, also the abatements or bearings by which the arms of a family are broken or diminished. See **IMPALDRY**.

BROACH, bröch, or BAROACH (*Barygaza* in the *Periplus* of the first century A.D., from Skt *Bharygachcha*, the town of Bhiga in the Seer, from *Kuacha*, river bank). A town of British India, in the presidency of Bombay, 203 miles north of Bombay (Map India, B 4). It is situated on an elevated mound, supposed to be artificial, on the north bank of the Neibudda, which is here 2 miles wide even at ebb tide, but shallow. The navigable channel is winding and difficult, even at high water—a feature mentioned as early as the first century A.D. It abounds in fine fish. A stone wall, about 40 feet high, fronts the river bank and protects the town from inundation. The streets are narrow, with tall houses. Situated in the midst of a fertile district, for 800 years it was a flourishing town, with a large population, but in consequence of political troubles, and the rise of Surat in the sixteenth century, it began to decay. Its trade consists chiefly of agricultural products and cotton. Broach was long famous for its manufactures of cloth, but that of the finer kinds declined, owing to the importation of English goods. Many of the weavers of Broach are Parsis, of whom some are of the more opulent classes—as shipowners and ship brokers. Broach has a remarkable Brahmanical hospital for sick animals, into which horses, dogs, cats, monkeys, peacocks, and even insects are received. It is ostensibly conducted by a number of Brahmans, who derive a good income from lands devoted to it and from voluntary contributions. Broach belonged to the Kingdom of Guzerat, on the overthrow of which by the Emperor Akbar was assigned to a petty Nawab. Falling under the dominion of the Peishwa of the Mahadattas, it was taken by the British in 1772, ceded to Scindia in 1783, in acknowledgment of the kind treatment of some British prisoners, and again stormed by a British force in 1803, since which date it has remained in the possession of the British. Pop., 1901, 42,806, 1911, 43,403.

BROAD ARROW. A conventionalized arrowhead which forms the government mark on British government stores.

BROAD/BENT, SIR WILLIAM HENRY (1835-1907). An English physician and author. He was educated at Owens College, the Royal School of Medicine in Manchester, and in Paris, and was appointed physician to the Western General Dispensary. Subsequently he was physician successively to the London Fever Hospital and St. Mary's Hospital and in 1881 became president of the Medical Society of London. In 1888 and 1889, and again in 1895 and 1896, he was censor of the Royal College of Physicians, in

1898-1901 was physician extraordinary to Queen Victoria, and in 1901 became physician in ordinary to King Edward VII. He published *The Pulse* (1890) and *The Heart* (1897). A volume of selections from his writings was edited and published by Walter Broadbent in 1908, and his *Life*, by his daughter, in 1909.

BROADBILL. A bird having a notable breadth of beak. 1. A scaup duck, or "bluebill" (See **SCAUP**). 2. The shoveler duck. (See **SHOVELER** and **PLATE OF DUCKS**). 3. The spoon-bill (q.v.). 4. A broadmouth (q.v.). 5. A bird. See **PLATE OF LYRE BIRD**, etc.

BROAD-BOTTOM ADMINISTRATION. A name derisively given to the English ministry formed by Henry Pelham in 1744, because it professed to include in a grand coalition all parties of weight and influence in the state, and comprised no less than nine ducks. The same phrase was applied also to Cartier's ministry (1742-44) by Horace Walpole.

BROADCASTING. A method of sowing which distributes the seed with some uniformity. When done by hand, the seed is carried in a bag at the left side and is scattered with the right hand as the sower walks. It is afterward covered with a harrow or by dragging brush over it. Machines for sowing grain or other seed are called broadcast seeders. The method of sowing by the drill is generally preferred. Broadcasting is largely limited to the sowing of spring grains and grasses.

BROAD CHURCH PARTY. A name loosely applied, from about the year 1850 onward, to a group of liberal leaders in the Church of England, of whom Thomas Arnold, Frederick Denison Maurice, Charles Kingsley, Frederick William Robertson, and Arthur Penrhyn Stanley were the most important. In their breadth of view they resemble the Latitudinarians of the seventeenth century—Cudworth, Whitchote, and More. The designation "Broad" churchmen is not wholly satisfactory and was disavowed by the leaders of the movement themselves. Its historic justification, however, lies in the fact that it describes the tendency towards doctrinal comprehensiveness, long prevalent in the Established church, which is properly called "broad," in distinction from "high" or "low" churchmanship. But it should always be borne in mind that the difference between the Broad Church party and the other two is less with reference to the doctrine of the Church as an institution than with reference to theology proper. It is in the field of doctrinal belief that breadth is most apparent. The members of this school were strongly influenced by the writings of Coleridge and by modern German theology. They were acquainted with the advancing scientific investigation and biblical study of their time. Maurice is perhaps best known as the theologian, Kingsley as the practical worker and writer, Robertson as the preacher, and Stanley as the historical writer of the group. In religious aim and method they are akin to certain other liberal leaders of the English church in the nineteenth century, such as Archbishop Whately and the writers of "Essays and Reviews" (q.v.). As champions of an earnest spiritual faith, Christian yet free, the Broad Churchmen have exercised an influence far beyond the limits of their own communion, and their writings have been read not only in Great Britain and America, but also upon the continent of Europe. Consult John Tulloch,

Movements of Religious Thought in Britain during the Nineteenth Century (London, 1885); John Hunt, *Religious Thought in England in the Nineteenth Century* (London, 1896); Cornish, *The English Church in the Nineteenth Century* (London, 1910); and the lives of Arnold, Maurice, Kingsley, Robertson, and Stanley.

BROADHEAD, GARLAND CARR (1827-). An American geologist, born near Charlottesville, Albemarle Co., Va. He studied at the University of Missouri and at the Western Military Institute in Kentucky. From 1871 to 1873 he was assistant State Geologist of Missouri and from 1873 to 1875 was State Geologist. He was a member of the jury on geology at the Philadelphia Centennial Exposition and in 1881 was a special agent of the tenth census for rendering a report on the quarrying industry of Missouri and Kansas. From 1884 to 1902 he was a member of the Missouri River Commission. For 10 years, beginning in 1887, he was professor of geology and mineralogy at the University of Missouri. It was he who gave the name to the Ozark series and to the Ozark Plateau. He became known as an authority on the coal measures of Missouri, on which he prepared a contribution to the *Transactions* (vol. ii, 1868) of the St. Louis Academy of Science. He also wrote a valuable report for nine counties of central Illinois in vol. iv, *Illinois Geological Survey Reports; Geological Survey of Missouri Iron Ores and Coal Fields* (1873); *Geological Survey of Missouri* (1873-74).

BROAD-HEADED SNAKE. See DEATH ADDER.

BROADHURST, GEORGE H. (1866-). An American playwright. He is author of many successful plays and musical comedies, including: *What Happened to Jones*, *Why Smith Left Home*, *The Wrong Mr. Wright*, *A Fool and his Money*, *The Crown Prince*, *The Man of the Hour*, *The Mills of the Gods*, *Bought and Paid For*, and the *Duke of Duluth* and *Nancy Brown*, musical comedies. *To-Day*, a play by Broadhurst and A. S. Schomer, was produced in New York in 1913.

BROADHURST, HENRY (1840-1911). An English legislator and labor organizer. The son of a journeyman stonemason, he began at 14 to follow his father's trade and continued in it until 1872, when a lockout in the building trades brought him to the front as a labor leader. In 1875 he became secretary of the Labor Representation League. He was especially prominent in English labor movements and in 1876 was secretary of the Parliamentary committees of the Trades Union Congress. In 1880 he was elected to Parliament and continued as a member except for an interval of a year and a half until his resignation in 1906. He became Undersecretary to the Home Office in 1886, and served on various commissions appointed to investigate labor questions. His publications include *Handy Book on Leasehold Emfranchisement* (1885), and his autobiography (1901).

BROADMOUTH, or **BROADBILL**. One of about a dozen species of small birds, distributed from the Himalayas to the Philippines, and characterized by excessive breadth of beak. They constitute a family, Eurylemidae, the affinities of which have been long disputed, but the best opinion now regards it as worthy of an order Eurylemiformes, which, with that of the lyre bird, comes close to the Passeriformes. Seven genera and 16 species are known. These birds

are no larger than sparrows, inhabit the woods in small flocks, are brilliant in plumage, but songless and lethargic, and are mainly frugivorous; but two species (of the genus *Calyptomena*) are insect eaters. These last "are remarkable for their rich green plumage and the way in which the frontal feathers project upward and forward, so as to . . . form a disk-like prominence." See plate of LYRE BIRD, etc.

BROAD RIVER. A stream of North and South Carolina, rising in the Blue Ridge and joining with the Saluda to form the Congaree (Map: South Carolina, C 2). The city of Columbia is at the junction of the two rivers. The country around Broad River is exceedingly fertile and productive. The stream is about 220 miles long and navigable for small vessels about 141 miles above Columbia.

BROADS, THE. An extensive marshy tract in the eastern part of Norfolk Co., England. It is traversed by numerous navigable channels and is a favorite resort of hunters.

BROADSIDE, or **BROADSHEET**. A variety of pamphlet, consisting normally of a single large sheet, printed on one side only and most frequently without division into columns. The broadside flourished chiefly in England and was in use from the invention of printing for royal proclamations, papal indulgences, and similar documents. It made a considerable figure throughout western Europe, about the middle of the sixteenth century, in times of political agitation. In England it was very largely used for popular ballads, which were hawked about the streets. During the first 10 years of Elizabeth's reign the names of no less than 40 ballad printers appear in the Stationers' Registers; but comparatively few specimens have been preserved from the reigns of the Tudor sovereigns or of James I. The broadside, as representing an outburst of popular feeling, was more commonly employed during the Civil War and seems to have reached its culminating point in the time of James II, when even poems by Dryden were printed and circulated on broadsides. From that period, with the increase in the number of newspapers and the liberty of the press, it gradually died out, though still numerous even under the Georges. The collection of these sheets has always been a favorite pursuit among antiquarians, though never so popular as in recent years. Robert Burton, the author of the *Anatomy of Melancholy*, was one of the earliest collectors. John Selden made a considerable collection of broadside ballads, which passed at his death to Pepys; the diarist had 1800 English ballads, which, bound in five folio volumes, are now in the library of Magdalene College, Cambridge. One of the most famous collections is that known by the name of the Duke of Roxburghe, now in the British Museum, gathered chiefly by Robert Harley, Earl of Oxford, and including 2048 broadsides, bound in three volumes. In 1898 Lord Crawford had, at Haigh Hall, Wigan, something like 19,000. For a minute and scholarly description of the English part of these, consult *Bibliotheca Lindesiana* (Aberdeen, 1898). The word "broadside" in America is often applied to roughly printed excerpts from magazines sent out in advance to the newspapers for comment.

BROADSTAIRS (formerly *Bradstowe*). A town on the coast of Kent, England, about 3 miles southeast of Margate (Map: England, II 5). It is a popular summer resort, and has a

small pier built early in the sixteenth century, and an archway leading to the shore supposed to have been erected in 1540. Dickens visited Broadstairs frequently between 1837 and 1851 and described it in a sketch entitled *Our English Watling-Place*. Pop., 1891, 5234, 1901, 6460, 1911, 8929.

BROADSWORD A broad-bladed sword for cutting only, not for stabbing, and therefore not sharp at the point like a sabre.

BROAD'US, JOHN ALBERT (1827-95) An American clergyman, born in Culpeper Co., Va. He graduated at the University of Virginia in 1850, was professor of ancient languages there from 1851 to 1853, and during this period was also pastor of the Baptist Church in Charlottesville. In 1859 he became professor of New Testament interpretation and homiletics in the Southern Baptist Theological Seminary, which had just been established in Greenville, S. C., but is now located in Louisville, Ky. For many years preceding his death he was president of the institution. He wrote *College Education for Men of Business* (1875), *A Treatise on the Preparation and Delivery of Sermons* (23d ed., 1898).

BROADWAY The principal thoroughfare of New York, and one of the most important business streets in the world. Beginning at Bowling Green, near the southern extremity of Manhattan Island, it runs north to Central Park, and is thence continued by the extension formerly called the Boulevard, now a part of Broadway, to the northern part of the island. Broadway is practically a continuous road to Albany and bears the same name in many of the Hudson River towns through which it passes. The first grant of a lot on Broadway was made in 1643 to Martin Kregier, whose tavern, at the present No. 9, later became Burns's Coffee House and subsequently the Atlantic Gardens. In the early part of the nineteenth century various portions of Broadway, then only some two miles long, became in turn the fashionable residence section of the city. Now the street below and above Central Park is given up almost exclusively to business. Below Chambers Street are most of the offices of great corporations. Then follows the wholesale dry-goods district, which at Eighth Street gives way to the shopping district, recently removed to Thirty-fourth Street and beyond, while Forty-second Street is the centre of the theatre district. From Fifthth Street north the street is more and more given over to apartment houses. The rapid-transit subway of New York throughout part of its course runs under the surface of Broadway. Consult Jenkins, *The Greatest Street in the World* (New York, 1911), and Kerfoot, *Broadway* (Boston, 1911).

BROAD-WINGED HAWK See BUZZARD.
BROB'DINGNAG A strange land described in Swift's *Gulliver's Travels* (1726). The inhabitants of this wonderful country are represented as giants, about "as tall as an ordinary spire-steeple," and everything else is on the same enormous scale. The original satire of the work is now largely forgotten and the adjective *brobdingnagian* has arisen as a synonym of "gigantic." The name is frequently, though incorrectly, spelled *Brobdingnag*. Swift wrote a mock letter from Captain Gulliver to his cousin Sympson, in which complaint was made that Brobdingnag had been wrongly printed for Brobdingrag; but this was only a feint to mystify the public. See SWIFT, JONATHAN.

BROCA, PAUL (1824-80) A French anthropologist, born at Sainte-Foy-la-Grande, Gironde. He studied at the Communal College of Sainte-Foy and the Ecole Polytechnique and Faculté de Médecine of Paris, became in 1846 assistant in anatomy to the Faculté, in 1848 prosecutor, and subsequently professor of surgical pathology. At various times he also held appointments as surgeon to important hospitals, including La Pitié and La Salpêtrière. In 1847, when he was connected as medical assistant with a commission for the preparation of a report on excavations in the church of the Celestins, he began a thorough study of anthropology. In 1859, amid difficulties caused by the hostility or indifference of other scientists and by the opposition of the government, which suspected political plots, he founded the Anthropological Society of Paris. From the formation of this society, officially authorized in 1861, modern anthropological science may be said to date. Broca established in 1872 the *Revue d'Anthropologie*, among the foremost periodicals of its class, in which many of his own works originally appeared. Finally he founded, in 1876, at Paris, the well-known Ecole d'Anthropologie, equipped with laboratories, a library, and a well-stocked museum. Among its numerous courses was one by himself on the comparative anatomy of the primates. The society, the school, and the laboratories are now known under the collective title of the Anthropological Institute. During all this time Broca was constantly occupied with researches, many important results of which were published in *Instructions générales pour les recherches anthropologiques* (1865) and *Instructions craniologiques et craniométriques* (1875). In 1861 he made and announced his noteworthy discovery of the seat of articulate speech in the third convolution of the left frontal lobe of the brain, since commonly called the "convolution of Broca." Disease in this convolution, cutting off the blood supply from it, or severing the fibres that lead from it to other parts of the brain, causes inability to make the effort needed to pronounce words or to read aloud. (See APHASIA, NERVOUS SYSTEM.) The importance of Broca's contributions to anthropology cannot be overestimated.

Broca's activities were many-sided. He was one of the three directors of public assistance through the Franco-Prussian War, and from 1880 a permanent Senator. He was also interested in literature and aesthetics and has been described as an attractive raconteur and conversationalist. His friend and colleague, M. Jacques Bertillon, is quoted as having said of him, "Rarely has there been a mind so active, so equally open to all kinds of knowledge, and so equally fond of all kinds." His energy as both teacher and writer was truly enormous. Besides numerous memoirs on a wide range of subjects, and an extensive list of contributions to the *Bulletins* of the Anthropological Society and the *Revue d'Anthropologie*, he published the celebrated work, *Des anomalies et de leur traitement* (1856), *L'Ethnologie de la France* (1859), *Recherches sur l'hybridité animale en général et sur l'hybridité humaine en particulier* (1860), *Traité des tumeurs* (1865-69), *Mémoires sur les caractères physiques de l'homme préhistorique* (1869), and *Mémoires d'anthropologie* (4 vols., 1871-83). Consult *Correspondance de Paul Broca* (2 vols., Paris, 1886). A statue of him by Choppin was placed

in the Ecole de Médecine in 1887. Consult the biography by Pozzi (Paris, 1880).

BROCADE' (Sp. *brocado*, It. *broccato*; cf. Fr. *brocher*, to stitch, embroider). A woven fabric of silk on which figures are formed by the threads of the warp or filling being raised so as to produce the required pattern. Brocades have long been manufactured in Oriental countries, and in Europe since the thirteenth century. The earlier and richer brocades were composed in part of gold and silver threads, and the name is often applied to the simplest silk fabrics thus enriched.

BROCAGE, brók'aj, **BROKERAGE**. In general the business of procuring contracts for others. (See **BROKER**.) Specifically, the business of bringing about marriage contracts. This business is deemed unlawful, as being contrary to public policy, and as a consequence the law refuses to enforce agreements for the services of a marriage broker and denies to such a broker any legal right to the compensation agreed to be paid him therefor. In a recent case in England it has even been held that a contract to introduce a person to various persons of the opposite sex with a view to marriage was illegal and that money paid under such a contract might be recovered. (Hermann v. Charlesworth [1905], 2 K. B. 123.)

BRO'CATEL. A coarse fabric of silk and wool or silk and cotton with figured designs resembling those of brocade, used largely for tapestry and upholstery. The term is also applied to a damask satin in which the satin ornamentation is on a less lustrous ground of the same color.

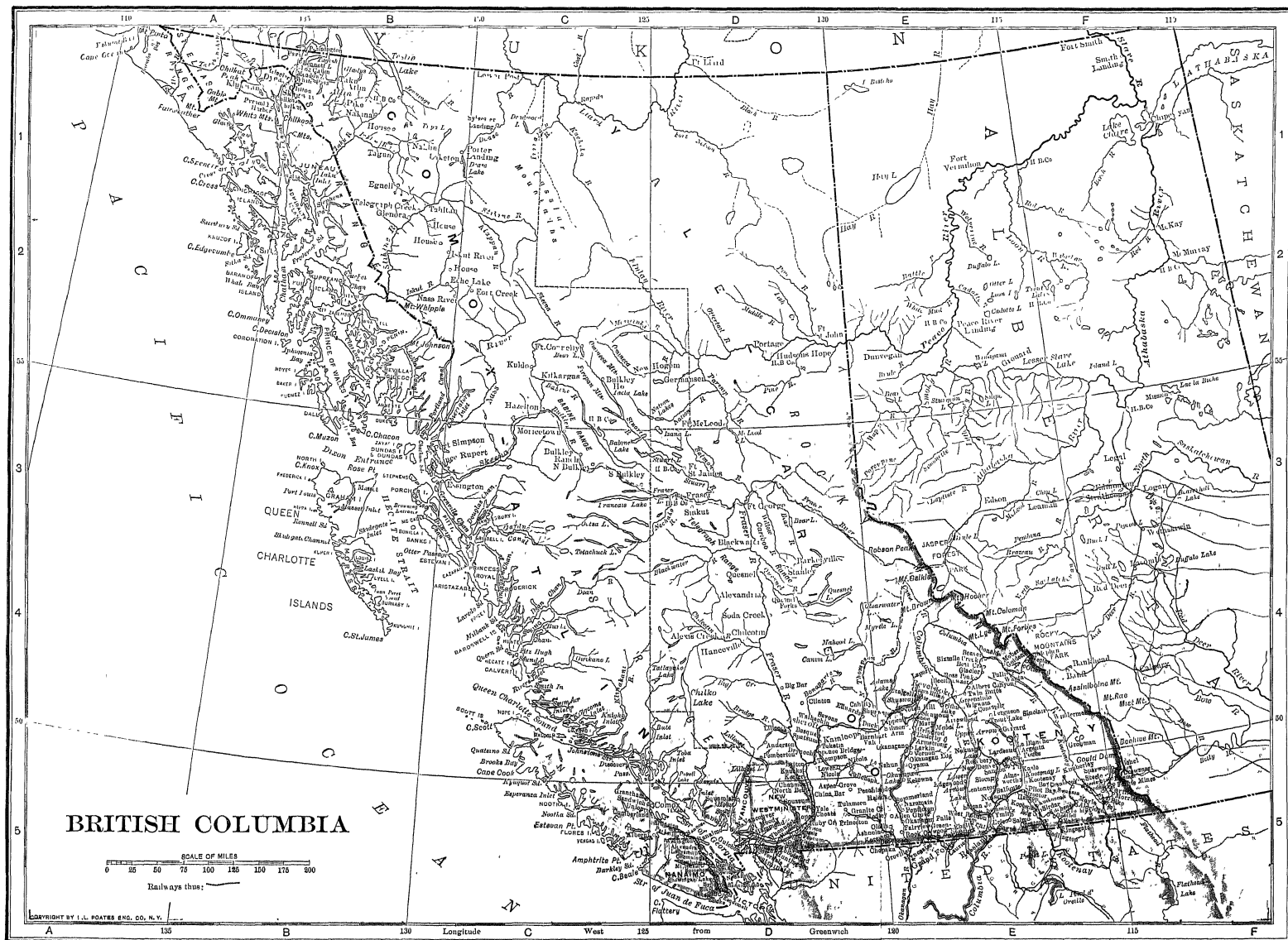
BROCCHI, brók'kí, GIOVANNI BATTISTA (1772-1826). An Italian mineralogist and geologist. He was born in Bassano, studied in Pisa, Rome, and Venice, and was professor of botany in Brescia, but devoted himself largely to geology. In 1809 he was made inspector of mines in Milan. During his travels through Italy he made many observations regarding Tertiary fossils, and his "Fossil Conchology," published in 1814, is a recognized masterpiece of paleontological literature. In 1823 he went to Egypt, and two years later Mehmet Ali made him one of a commission to organize the provinces of Senar; but he soon fell a victim to the climate of Khartum. His works include: *Trattato mineralogico e chimico sulle miniere di ferro del dipartimento del Meila* (2 vols., 1807); *Memoria mineralogica sulla Valle di Fassa nel Tirolo* (1811); *Conchologia fossile subappennina con osservazioni geologiche* (2 vols., 1814); *Dello stato fisico del suolo di Roma* (1820).

BROCCOLI. A variety of cauliflower (q.v.). **BROCHANTITE**. A basic sulphate of copper commonly found in acicular orthorhombic crystals or drusy crusts of an emerald-green or blackish-green color and vitreous lustre. It is mostly found associated with other copper minerals, of which it is often an alteration product.

BROCK, SIR ISAAC (1760-1812). An English soldier, known as the "Hero of Upper Canada." He was born in Guernsey, entered the army as an ensign at the age of 15, and rose by purchase, in accordance with the custom of the time, to the rank of lieutenant colonel (1797). He led his regiment in the North Holland expedition in 1799, when he was wounded at Egmont-op-Zee, and then fought in the naval battle of Copenhagen. He served in Canada from 1802 to 1805, when he went to England on leave; but

returned in 1806, on account of the threatened hostilities between England and the United States, and commanded the Quebec garrison until 1810. He was then put in command of all troops in Upper Canada, and was soon afterward appointed provisional Lieutenant Governor of the province. In 1811 he was promoted major general. Upon the outbreak of the War of 1812 he made energetic preparations to repel an invasion by an American force under Gen. William Hull, and on Aug. 16, 1812, with a small force of Indians and whites, he captured Detroit. (See HULL, WILLIAM.) For this he was made an extra Knight of the Bath. On October 13, during the American attack upon Queenston, he fell mortally wounded at the head of his troops, his last words being, "Never mind me; push on the York Volunteers." Soon afterward a monument to him was erected in St. Paul's, London, with money appropriated by the House of Commons. In 1824 his remains were removed from a bastion of Fort George to Queenston Heights, where a monument costing £3000 was erected by the Provincial Legislature. This monument was destroyed by a fanatic in 1840; and in July, 1841, a mass meeting of more than 8000 people, presided over by the Lieutenant Governor of Upper Canada, voted £5000 for the present monument, a tall shaft surmounted by a statue of Brock. Consult Tupper (Brock's nephew), *Life and Correspondence of Sir Isaac Brock* (London, 1845; 2d ed., much enlarged, 1847), and Lady M. Edgar, *General Brock* (Toronto, 1904).

BROCK, SIR THOMAS (1847-). A prominent English sculptor. He was born in Worcester and studied principally in London as a pupil and assistant of J. H. Foley and afterward at the Royal Academy. After Foley's death Brock was commissioned to complete his unfinished works; among others, the monument to Daniel O'Connell in Dublin and Lord Canning in Calcutta. Brock's art, like that of his master, Foley, was a protest against the prevalent classicism in British art. But he allowed the leavening influence of French sculpture to modify and develop his style to a height never attained by Foley. Though not always original, his art is invariably dignified and refined. Among the best known of his statues are those of Robert Raikes (Thames Embankment, London); the bronze equestrian statue of the Black Prince (City Square, Leeds); the seated marble statue of Bishop Philpott in Worcester Cathedral; the admirable statue of Thomas Gainsborough with palette and brushes (Tait Gallery, London); the recumbent statue of Lord Leighton in St. Paul's, and Sir Henry Irving (1910). After executing a number of statues and busts of Queen Victoria, he was in 1901 commissioned, as the best portraitist of the day, to prepare the sculptural designs of the national monument to the Queen in front of Buckingham Palace, upon which he was still working in 1914, by far the largest and most ambitious monument in London. Among the best examples of his purely ideal figure work are "Ive," "A Moment of Peril" (both in the National Gallery), and the graceful marble called "The Genius of Poetry." Brock was elected associate of the Royal Academy in 1883, member in 1891, and was knighted in 1911; he is also honorary member of the Société des Artistes Français. Consult Spielmann, *British Sculpture of To-Day* (London, 1901).



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